INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

MODEL LM
E PACKAGE

THIS MANUAL APPLIES TO UNITS
BEARING SERIAL NO. PREFIXES A-C

LAMBDA

LAMBDA ELECTRONICS CORP.–MELVILLE, L. I., N. Y.

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This manual provides instructions intended for the operation of Lambda power supplies, and is not to be reproduced without the written consent of Lambda Electronics Corp.

LAMBDA ELECTRONICS CORP. MELVILLE, L.I., N.Y.

MAIN PLANT TELEPHONE: 516 MYrtle 4-4200

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SPECIFICATIONS AND FEATURES

The following specifications apply for all Lambda E package LM power supplies. Specification exceptions noted here relate to models incorporating model option "Y" and/or "T". Performance specifications do not change for models with suffix "R", e.g., LM-E2-R unless the models also include model options "Y" and/or "T" e.g., LM-E2-YR; for these models the appropriate specification exceptions also apply.

NOTE: Specifications in italics apply only for Lambda models with a "Y" suffix, e.g., LM-E2-Y. AC INPUT specification with an asterisk*, applies only for Lambda models with a "V" or "T" suffix, e.g., LM-E2-YT.

DC OUTPUT--Voltage regulated for line and load

Voltage Range.... For voltage range see table I of pertinent model group.

Multi-Current Ratings.... Current ratings specified for each maximum ambient temperature apply over entire output voltage range, with input frequency 55-65 cps. For input frequencies 45-55 at 105-132 VAC, 200-250 VAC, or 205-265 VAC, delete 40°C rating.

For input frequencies 360-440 cps, consult factory for current ratings.

For maximum current ratings at each ambient temperature see table I of pertinent model group.

REGULATED VOLTAGE OUTPUT

Regulation (line)... Less than 0.05 percent plus 4.0 millivolts for input variations from 105-132 or 132-105 volts AC

... Less than 0.01 percent plus 1.0 millivolt for input variations from 105-132 or 132-105 volts AC

Regulation (load)... Less than 0.03 percent plus 3.0 millivolts for load variations from 0 to full load or full load to 0

... Less than 0.02 percent plus 2.0 millivolts for load variations from 0 to full load or full load to 0

Remote Programming

External Resistor... Nominal 200 ohms/volt output

Programming Voltage... One-to-one voltage change

Ripple and Noise... One millivolt rms; 3 millivolts peak-to-peak with 60 cps input

... 0.5 millivolt rms; 1.5 millivolts peak-to-peak with 60 cps input

... 1.0 millivolt rms; 10 millivolts peak-to-peak with 400 cps input

Temperature Coefficient... Change in output voltage less than *0.03%/°C*

... Change in output voltage less than 0.01%/°C

AC INPUT--105-132 volts AC at 45-440 cps; 450 watts+

+ With output loaded to full 40°C rating and input voltage 132 volts at 55-65 cps.

*...200-250 volts AC at 45-440 cps ("T" option)

*...205-265 volts AC at 45-440 cps or 187-242 volts AC at 45-440 cps ("V" option)

INPUT FUSE--"SLO-BLO" fuse F1 protects the AC input circuit. Overload of the supply does not cause fuse failure.

"SLO-BLO" fuse F2 protects the load from excessive output current that can be caused by internal circuit failure.

For fuse ratings see table I of pertinent model group.

OVERLOAD PROTECTION

Thermal.... Thermostat resets automatically when overtemperature condition is eliminated

Electrical... Within rated voltage range, an automatic electronic current-limiting circuit limits output current to approximately 110 percent of 40°C rated current for protection of load and power supply; for overloads approaching short circuit, both voltage and current decrease until at short circuit, current is reduced to a safe value, except for models LME-0-7, 0-14, 0-32 and 0-60, where output current remains limited to 110 percent of 40°C rated current at 40°C ambient.

OVERSHOOT--No overshoot of output voltage under conditions of power turn-on, power turn-off, or power failure.

INPUT AND OUTPUT CONNECTIONS--Heavy duty terminal block on rear of chassis

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE--Continuous duty from -20°C to 71°C ambient with corresponding load current ratings for all modes of operation, and all mounting positions.

STORAGE TEMPERATURE-- -55°C to +85°C

CONTROLS

DC output control... Voltage adjust control permits adjustment of DC output voltage via access hole located in nameplate.

REMOTE SENSING--Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

PHYSICAL DATA

Size ..... 4-15/16" H x 7-1/2" W x 11-7/8" D

Weight..... 28 lbs. net; 31 lbs. shipping wt.

Finish ..... Grey, FED STD 595 No. 26081

MOUNTING--Three surfaces, each with tapped mounting holes, can be utilized for mounting this unit. Unit must be mounted so that radiator fins are always vertical. Refer to figure 9 for mounting details.

ACCESSORIES

Rack Adapters... Rack adapters LRA-4 and LRA-6, used for ruggedized mounting, with or without chassis slides, are available, as well as rack adapters LRA-3 and LRA-5 which are used for simple rack installations where chassis slides are not required.

Metered and Non-Metered Panels... Metered panels MP-3, MP-5, and Non-Metered panels P-3, P-5 are available for use with the Lambda rack adapters.

Blank Panels... Full-rack, half-rack and quarter-rack panels can be used with the Lambda rack adapters. The following chart lists the panels and rack adapters that can be utilized together.

Rack Adapter	BLANK PANELS			Metered/Non Metered Panel
	1/2 Rack	1/4 Rack	Full Rack	
LRA 3	LBP-20	LBP-10	LBP-40	MP-5, P-5
LRA 6	LBP-20	LBP-10	LBP-40	MP-5, P-5
LRA 4	LBP-50	LBP-60	LBP-30	MP-3, P-3
LRA 5	LBP-50	LBP-60	LBP-30	MP-3, P-3

Overvoltage Protector... Externally mounted, Overvoltage Protectors LMOV-1, LMOV-2 and LMOV-3 are available for use with Lambda LM power supplies.

MODEL OPTIONS

Suffix "T" Input Option... Standard LM power supplies are available for operation with 200-250 volt, 45-440 cps input.

Suffix "Y" High Performance Option... All Lambda LM power supplies are available with high performance specifications. See italicized entries under SPECIFICATIONS AND FEATURES.

Suffix "R" Fungus Proofing Option... Standard LM power supplies can be obtained with fungus proofing treatment with MIL V 173 varnish for all fungi nutrient components.

Suffix "V" Input Option... Standard LM power supplies are available for operation with 205-265 volt, 45-440 cps input or 187-242 volt, 45-440 cps input. See nameplate for AC input rating. See schematic diagram for rewiring of AC input.

Suffix "S" Option... Standard LM power supplies are available for use with Lambda Systems Power Sequencer or Systems Power Protector. All fixed voltage power supplies must be specified with the "S" option when used with the Systems Power Sequencer.

THEORY OF OPERATION

GENERAL

The Lambda power supply consists of an AC input circuit and transformer; a bias supply consisting of an auxiliary rectifier, filter, and a zener diode regulator; and a main regulator circuit consisting of the main rectifier and filter, a series regulator, emitter follower drivers, an error amplifier, a current limit amplifier, an output voltage sensing circuit and an output current sensing circuit. In addition, certain models also contain a voltage amplifier circuit.

The circuit arrangement is shown in block diagram form in figure 7. The circuitry is discussed with reference to the block diagram and the schematic diagram.

FUNCTIONAL DESCRIPTION

Single phase input power is applied to transformer T1 through the input circuit containing thermostat S1, which protects the supply against overheating.

The main rectifier, a full-wave rectifier, provides the power which is filtered by capacitors C18, C19 and then regulated via a series regulator and delivered to the output. Bias supply, half-wave, auxiliary rectifier CR7, provides voltage filtered by capacitor C7 and regulated by zener diode CR6 for current limit amplifier Q3 and error amplifier Q1, Q2 (or, as applicable, for voltage amplifier Q2). Zener diode CR1 and resistor R5, across the bias supply, provide a regulated temperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

Operation of the voltage regulator circuit is determined by changes in the output voltage. A change in the output voltage is sensed by the sensing divider resistors which compare output voltage with the +S reference voltage. This provides an error voltage at junction of R2 and R3 (or, as applicable, R1 and R3), which is amplified by error amplifier Q1 and Q2 and is current amplified by drivers Q5, Q6 (and, as applicable by Q8, Q9). The amplified signal from the drivers controls the voltage across series regulator Q8-Q12 (or, as applicable, Q8-Q13 or Q10-Q13), which functions as the active regulating element, restoring output voltage to the proper level.

*Current limit circuit operation is determined by changes in the load. Current limit amplifier Q3 samples load current through current sensing resistor R25A (or, as applicable R25). When the voltage drop across this resistor increases compared with the preset voltage reference determined by R17 and R18, Q3 conducts. Thus, when the output current rating of the unit is exceeded, current limit amplifier Q3 conducts, decreasing the current through drivers Q5, Q6, (and, as applicable by Q8, Q9), resulting in an increase of voltage across the series regulator and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17.

When operating conditions approach short circuit, the output voltage decreases. Since the voltage determined by R17 and R18 is proportional to the output voltage, when the output voltage decreases, Q3 is biased into turn-on at lower and lower load currents until output voltage decreases to zero and current decreases to a predetermined low value.

*The following theory only applies for units with voltage amplifier Q2.

Current limit circuit operation is determined by changes in the load. When load current increases above the rated current value, the voltage drop across current limit potentiometer R17 increases, turning on current limit amplifier Q3. With Q3 conducting, the current to driver Q5 decreases, limiting the base current to series regulator Q8-Q13, which results in an increase of voltage across the series regulator and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17.

When operating conditions reach short circuit, the output voltage value decreases to zero and the current decreases to a predetermined current limit value and remains unchanged.

OPERATING INSTRUCTIONS

BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provided the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. *When load current exceeds 110% of 40°C rating, both voltage and current decrease until voltage reaches zero and the current at short circuit equals approximately 30 percent or less of the rated current.

*For models LME-07, LME-0-14, LME-0-32, and LME-0-60 output current remains limited to 110% of 40°C current rating.

MOUNTING

When using this unit as a mounted component, a cutout must be provided to permit free-flow of air through the unit. See figure 9 for cutout sizes and specific mounting details.

CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative or positive output terminal grounded. Both positive and negative ground connections are shown in the diagrams for all suggested output connections illustrated in this manual.

Connection Terminals. Make all connections to the supply at the terminal block on the rear of the supply. Apply input power to terminals 1 and 2; always connect the ungrounded (hot) lead to terminal 1.

The supply positive terminal is brought out to terminal 6; the negative terminal to terminal 4.

NOTE: When shipped from the factory, the supply is ready for use as a local-sensing constant voltage source. Jumpers are connected at the factory as shown in figure 3. Take care to remove the appropriate jumpers for load requirements that need different supply-load connections. Refer to the appropriate connection diagram.

Supply-Load Connections. The regulation of the supply at the load may change when connecting leads of practical length are used. To minimize the effect of the output load leads, remote sensing is used. Refer to figure 1 to determine voltage drop for particular cable lengths, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Local-Sensing Connection, See Figure 3.

Remote-Sensing Connection, See Figure 4.

Programmed Voltage Connection Using External Resistor, See Figure 5. Discrete voltage steps can be programmed with a resistance voltage divider valued at nominal 200 ohms/volt output and a shorting-type switch. For continuous voltage variations, use a variable resistor with the same ohms/volt ratio in place of the voltage divider and shorting-type switch. Use low temperature coefficient resistor(s) to assure most stable operation.

Programmed Voltage Connection Using Programming Voltage, See Figure 6. The power supply voltage output can be programmed with an externally connected programming power supply. The output voltage of the programmed supply will maintain a one-to-one ratio with the voltage of the programming supply.

The programming supply must have a reverse current capability of 6 ma. minimum.

Alternatively, when supplies with less than 6 ma. reverse current capability are used, a resistor capable of drawing 6 ma. at the minimum programming voltage must be connected across the output terminals of the supply. This programming supply must be rated to handle all excess resistor current at the maximum programming voltage.

Operation After Thermostat Shutdown. The thermostat opens the input circuit only when the power supply output current exceeds the current rating specified for the operating ambient temperature, causing the unit to overheat. Do not exceed current rating specified for the operating ambient temperature. When the temperature of the unit decreases to a safe operating value, the thermostat will reset automatically.

Operation After Fuse Shutdown. Internal component failure is prevented by fuses which protect the components from damage caused by excessive currents. Fuses will blow when the maximum rated current value for the fuse is exceeded. Fatigue failure of fuses can occur when mechanical vibrations from the installation combine with thermally induced stresses to weaken the fuse metal. Many fuse failures are caused by a temporary condition and replacing the blown fuse will make the fuse protected circuit operative.

MAINTENANCE

GENERAL

This section describes trouble analysis routine, calibration and test procedures that are useful for servicing the Lambda power supply. A trouble chart is provided as an aid for the troubleshooter. Refer to the section on specifications and features for the minimum performance standards.

TROUBLE ANALYSIS

Whenever trouble occurs, systematically check all fuses, primary power lines, external circuit elements, and external wiring for malfunction before trouble shooting the equipment. Failures and malfunctions often can be traced to simple causes such as improper jumpers and supply-load connections or fuse failure due to metal fatigue.

Use the electrical schematic diagram and block diagram, figure 7, as an aid to locating trouble causes. The schematic diagram contains various circuit voltages that are averages for normal no load operation. Measure these voltages using the conditions for measurement specified on the schematic diagram. Use measuring probes carefully to avoid causing short circuits and damaging circuit components.

CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an in-circuit transistor checker. If no checker is available, transistors can be checked with an ohmmeter that has a highly limited current capability. Observe proper polarity for PNP or NPN to avoid error in measurement. The forward transistor resistance is low but never ZERO; backward resistance is always higher than the forward resistance.

Do not assume trouble is eliminated when only one part is replaced. This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on, before checking for additional faulty components could damage the replaced component.

When soldering semi-conductor devices, hold the lead being soldered with a pair of pliers or a commercial heat sink device placed between the component and the solder joint.

> NOTE: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases the capacitors are shunted with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

PRINTED CIRCUIT BOARD MAINTENANCE TECHNIQUES

1. If foil is intact but not covered with solder it is a good contact. Do not attempt to cover with solder.

2. Voltage measurements can be made from either side of the board. Use a needle-point probe to penetrate to the wiring whenever a protective coating is used on the wiring. A brass probe can be soldered to an alligator clip adapted to measuring instrument.

3. Always use a heat sink when soldering transistors; a transistor pad with mounting feet is an effective heat sink.

4. Broken or damaged printed wiring is usually the result of an imperfection, strain or careless soldering. To repair small breaks, tin a short piece of hook-up wire to bridge

the break, and holding the wire in place, flow solder along the length of wire so that it becomes part of the circuitry.

5. When unsoldering components from the board never pry or force loose the part; unsolder the component by using the wicking process described below:

   (a) Select a 3/16 inch tinned copper braid for use as a wick; if braid is not available, select AWG No. 14 or No. 16 stranded wire with 1/2 inch insulation removed.

   (b) Dip the wick in liquid rosin flux.

   (c) Place the wick onto the soldered connection and apply soldering iron onto the wick.

   (d) When sufficient amount of solder flows onto the wick, freeing the component, simultaneously remove iron and wick.

TROUBLE CHART

The trouble chart is intended as a guide for locating trouble causes, and is used along with the schematic diagram.

The operating conditions assumed for the trouble chart are as follows:

(a) AC power of proper voltage and frequency is present at input terminals.

(b) Either positive or negative terminal is connected to chassis ground.

(c) The power supply is connected for constant voltage with local sensing. See schematic; dotted lines indicate jumpers connected for local sensing operation.

TROUBLE CHART

Symptom	Probable Cause	Remedy
1. No output voltage	No power input, thermostat S1 open	Check power source, S1, line cord and line cord plug; shut off unit, allow to cool and check ambient temperature
	Improper output terminal connection	Refer to appropriate connection diagram, and check for correct connections
	Faulty Q2, CR1, CR6 (or Q3 for zero-volt units)	Check Q2, CR1, CR6 (or Q3) for short and replace as required
2. Unable to adjust output voltage	Damaged VOLTAGE ADJUST control	Check R1 for shorts and/or open; replace as required
	Supply operating as constant current source at current limit value	Remove load, check load value and check for shorts and/or improper supply-load connections; refer to appropriate diagram for correct connections
3. Output voltage too high	Improper output terminal connection	Refer to appropriate connection diagram, and check for correct connections

TROUBLE CHART (Cont'd)

Symptom	Probable Cause	Remedy
3. (Cont'd)	Faulty Q1, R1, Q8-Q12, (or Q8-Q13 or Q10-Q13 as appl) Q5, Q6 (and Q8, Q9 as appl) or CR1	Check R1 for open; Q8-Q12, (or Q8-Q13, or Q10-Q13) Q5, Q6 (and Q8, Q9) Q1 for short; CR1 for open and replace as required.
4. Output voltage too low	Load resistance improper for unit ratings	Check load resistance value
	Faulty Q2, Q3, R25A, (or R25), R17	Check Q2, Q3 for short, R25A (or R25) R17 for open, replace as required
5. High ripple and unregulated DC output	Load resistance improper for unit ratings	Check load resistance value
6. High ripple	Improper ground	Connect terminal 6 or terminal 4 to ground terminal 5

PERFORMANCE CHECK

Check the ripple and regulation of the power supply using the test connection diagram shown in figure 8. Use suggested test equipment or equivalent to obtain accurate results. Refer to SPECIFICATIONS AND FEATURES for minimum performance standards.

Set the differential meter, DC VTVM (John Fluke Model 825A or equivalent) to the selected power supply operating voltage. Check the power supply load regulation accuracy while switching from the full load to no-load condition. Long load leads should be a twisted pair to minimize AC pick-up.

Use a Variac to vary the line voltage from 105-132 or 132-105 volts AC and check the power supply line regulation accuracy on the VTVM differential meter.

Use a VTVM, Ballantine 320 or equivalent, to measure rms ripple voltage of the power supply DC output. Use oscilloscope to measure peak-to-peak ripple voltage of the power supply DC output.

ADJUSTMENT OF CALIBRATION CONTROL R17

Whenever Q3, R25A (or R25*) or R17 are replaced, and voltage and current indications do not reflect maximum ratings, adjust R17 as follows:

* For models LME-0-7, LME-0-14, LME-0-32, LME-0-60 adjustment is required only when R17 or R25 is replaced. The adjustment procedure requires that the power supply is removed from associated equipment, is at an ambient temperature of 25-30°C, and is stabilized and not operating.

1. Remove AC power input to the supply.

2. Unsolder wiper of R17 from resistor housing and turn to full CW position.

3. Operate power supply for constant voltage with local sensing, connected as shown in figure 3, with no external load.

4. ** Turn voltage adjust control until minimum rated output voltage is obtained.

5. ** Apply load so that output current is 110% of 40°C rating for the unit.

6.** Using an oscilloscope, Tektronix 503 or equivalent, observe output voltage while adjusting R17 in a CCW direction. Adjust R17 until output ripple increases sharply and oscilloscope pattern changes.

7.** After adjustment is completed, remove AC power input to the supply and solder wiper of R17 to resistor housing.

8.** After soldering, check setting and repeat adjustment procedure if required.

** Perform alternate steps 4A through 9A for adjustment of R17 on models LME-0-7, 0-14, 0-32, 0-60.

4A. Turn voltage adjust control until rated output voltage is obtained.

5A. Apply load so that output current is 130% of 40°C rating for the unit.

6A. Using an oscilloscope, Tektronix 503 or equivalent, observe unit output voltage while adjusting R17 in a CCW direction. Adjust R17 until output ripple increases sharply and oscilloscope pattern changes.

7A. Place a DC ammeter of appropriate scale across output terminals 4 and 6 of the supply. The meter indication shall be a maximum of 133% of 40°C rating for the unit.

8A. After adjustment is completed, remove AC power input to the supply and solder wiper of R17 to resistor housing.

9A. After soldering, check setting and repeat adjustment procedure if required.

SERVICE

When additional instructions are required or repair service is desired, contact the nearest office of the Lambda Electronics Corp. where trained personnel and complete facilities are ready to assist you.

Please include the power supply model and serial number together with complete details of the problem. On receipt of this information, Lambda will supply service data or advise shipping for factory repair service.

All repairs not covered by the warranty will be billed at cost and an estimate forwarded for approval before work is started.

PARTS ORDERING

Standard Components and special components used in Lambda power supply can be obtained from the factory. In case of emergency, critical spare parts are available through any Lambda office.

The following information must be included when ordering parts:

1. Model number and serial number of power supply and purchase date.
2. Lambda part number.
3. Description of part together with circuit designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

PARTS LIST

The electrical parts located on all LM-E models are listed here. Parts common to a group of LM-E models are listed first. Unique parts of individual models within the group are listed separately, by model, immediately following the group common-parts listing. In addition there are separate listings of parts for the metered panel (MP) option, the Y option and the overvoltage protection (OV) option, as applicable, for all LM-E models. The parts listed for model LME-0-7 do not utilize the common parts -- unique parts listings; all the parts for this model are sequentially listed under the heading "PARTS FOR MODEL LME-0-7". Parts for the T option, V option and R option are included at the end of this listing.

MODELS LM-E3 — LM-E12

COMMON PARTS

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	$ .27
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003	.33
C4	Cap., elect., 3.0 mfd -10% +75%, 100 vdc	CBN-30-015	1.58
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.25
C6	Same as C5		
C7*	Cap., elect., 140 mfd -10% +100%, 38 vdc	CBR-14-030	1.58
C8	Not used		
C9	Cap., mylar, 0.22 mfd ±10%, 200 vdc	CGM-22-002	.41
C10	Same as C9		
C11	Not used		
C12	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK-10-004	.21
C13-C17	Not used		
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40
CR3	Same as CR2		
CR4-CR5	Not used		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR2		
CR8	Rectifier	FBL-00-083	3.57
CR9	Not used		
CR10	Not used		
CR11	Same as CR8		
Q1	Transistor, NPN	FBN-L110	3.25
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Not used		
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36845	4.13
Q7	Not used		
R3	Res., ww, 1,200 ohms ±3%, 2w	DFS-12-030	.90
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30

MODELS LM-E3 — LM-E12 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R5	Res., film, 220 ohms ±2%, 1/2w	DCR-22-005	$ .30
R6	Res., comp., 180,000 ohms ±10%, 1/2w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/4w	DCB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB-1511	.10
R10	Res., comp., 2,200 ohms ±10%, 1/2w	DEB-2221	.12
R11	Res., comp., 22,000 ohms ±10%, 1/2w	DEB-2231	.12
R12	Res., comp., 47 ohms ±10%, 1/2w	DEB-4701	.12
R13*	Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
R14	Not used		
R15	Not used		
R16	Res., comp., 470 ohms ±10%, 1/2w	DEB-4711	.12
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2w	DNS-12-026	1.25
R19-R21	Not used		
R22	Res., comp., 330 ohms ±10%, 1/2w	DEB-3311	.12
R23	Res., comp., 22 ohms ±10%, 1/2w	DEB-2201	.12
S1	Thermostat	FKA-142-015	5.00
XF1	Fuseholder	HRM-00-009	.12
XF2	Fuseholder	HRM-00-012	.30

*This part not used on units with "Y" option

UNIQUE PARTS
MODEL LM-E3

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28

UNIQUE PARTS (Cont)

MODEL LM-E3 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
C19	Same as C18		
F1	Fuse, 5A, 3AG, SLO-BLO	FFC05-000	$ .18
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 300 ohms ±5%, 5w	DNR30-016	1.95
R2	Res., ww, 430 ohms ±3%, 3w	DFR43-058	.50
R18	Not used		
R24	Res., comp., 330 ohms ±10%, 1w	DGB3311	.10
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A, B, 0.10 ohm ±5%, 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E4	49.50

MODEL LM-E3P3

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 5A, 3AG, SLO-BLO	FFC05-000	.18
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-028	2.50
R2	Res., ww, 430 ohms ±3%, 3w	DFR43-058	.50
R18	Not used		
R24	Res., comp., 680 ohms ±10%, 2w	DHB6811	.15
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A, B, 0.10 ohm ±5%, 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E4	49.50

MODEL LM-E3P6

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 5A, 3AG, SLO-BLO	FFC05-000	.18
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-028	2.50
R2	Res., ww, 430 ohms ±3%, 3w	DFR43-058	.50

UNIQUE PARTS (Cont)

MODEL LM-E3P6 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R18	Not used		
R24	Res., comp., 680 ohms ±10%, 2w	DHB6811	$ .15
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A, B, 0.10 ohm ±5%, 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E4	49.50

MODEL LM-E4

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 5A, 3AG, SLO-BLO	FFC05-000	.18
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-028	2.50
R2	Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
R18	Not used		
R24	Res., comp., 680 ohms ±10%, 2w	DHB6811	.15
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A, B, 0.10 ohm ±5%, 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E4	49.50

MODEL LM-E4P5

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 7A, 3AG, SLO-BLO	FFC07-000	.21
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-028	2.50
R2	Res., ww, 650 ohms ±3%, 3w	DFR-65-062	1.00
R18	Res., film, 390 ohms ±5%, 1/2w	DCR39-004	.20
R24	Res., comp., 680 ohms ±10%, 2w	DHB6811	.15
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A, B, 0.10 ohm ±5%, 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E5	49.50

UNIQUE PARTS (Cont)

MODEL LM-E5

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	$ 2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 7A, 3AG, SLO-BLO	FFC07-000	.21
F2	Fuse, 40A, 4AG, SLO-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-028	2.50
R2	Res., ww, 650 ohms ±3%, 3w	DFR-65-062	1.00
R18	Res., film, 1,300 ohms ±5%, 1/2w	DCS13-010	.25
R24	Res., comp., 680 ohms ±10%, 2w	DHB6811	.15
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A,B, 0.10 ohm ±5% 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E5	49.50

MODEL LM-E6

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 7A, 3AG, SLO-BLO	FFC07-000	.21
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25
Q8	Transistor	FBN36972	6.50
Q9-Q12	Same as Q8		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-028	2.50
R2	Res., ww, 800 ohms ±3%, 2w	DFR80-037	.84
R18	Res., film, 1,300 ohms ±5%, 1/2w	DCS13-010	.25
R24	Res., comp., 680 ohms ±10%, 2w	DHB6811	.15
R25A	Res., ww, one section, 0.10 ohm ±5%, 11w	DFM20-054	1.50
R26A, B	Res., ww, tapped, two sections, A,B, 0.10 ohm ±5%, 11w each section	DFM20-054	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E6	49.50

MODEL LM-E8

C3	Cap., elect., 3,600 mfd -10% +100%, 20 vdc	CBS36-044	2.36
C18	Cap., elect., 25,000 mfd -10% +100%, 20 vdc	CBT25-011	12.28
C19	Same as C18		
F1	Fuse, 8A, 3AB, NORM-BLO	FFJ-08-000	.35
F2	Fuse, 40A, 4AG, NORM-BLO	FFE40-000	.25

UNIQUE PARTS (Cont)

MODEL LM-E8 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
Q8	Transistor	FBN36485	$ 4.13
Q9-Q12	Same as Q8		
R1	Res., var., ww, 1,000 ohms ±5%, 5w	DNS10-027	1.50
R2	Res., ww, 1,200 ohms ±3%, 2w	DFS12-030	.90
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001	.25
R24	Res., comp., 1,500 ohms ±10%, 2w	DHB1521	.24
R25A	Res., ww, one section, 0.18 ohm ±5%, 11w	DFM36-049	1.60
R26A, B	Res., ww, tapped, two sections, A,B, 0.18 ohm ±5%, 11w each section	DFM36-049	1.60
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E8	49.50

MODEL LM-E10

C3	Cap., elect., 2,100 mfd -10% +100%, 35 vdc	CBS21-043	3.67
C18	Cap., elect., 14,000 mfd -10% +100%, 35 vdc	CBT14-012	12.28
C19	Same as C18		
F1	Fuse, 8A, 3AB, NORM-BLO	FFJ-08-000	.35
F2	Fuse, 30A, 4AG, NORM-BLO	FFE30-000	.20
Q8	Transistor	FBN36485	4.13
Q9-Q12	Same as Q8		
R1	Res., var., ww, 2,200 ohms ±5%, 5w	DNS-22-056	2.50
R2	Res., ww, 1,200 ohms ±3%, 2w	DFS12-030	.90
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001	.25
R24	Res., comp., 1,500 ohms ±10%, 2w	DHB1521	.24
R25A	Res., ww, one section, 0.30 ohm ±5%, 11w	DFM60-050	1.45
R26A, B	Res., ww, tapped, two sections, A,B, 0.30 ohm ±5%, 11w each section	DFM60-050	1.45
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E10	49.50

MODEL LM-E12

C3	Cap., elect., 2,100 mfd -10% +100%, 35 vdc	CBS21-043	3.67
C18	Cap., elect., 14,000 mfd -10% +100%, 35 vdc	CBT14-012	12.28
C19	Same as C18		
F1	Fuse, 8A, 3AB, NORM-BLO	FFJ-08-000	.35
F2	Fuse, 30A, 4AG, NORM-BLO	FFE30-000	.20
Q8	Transistor	FBN36485	4.13
Q9-Q12	Same as Q8		
R1	Res., var., ww, 2,200 ohms ±5%, 5w	DNS-22-056	2.50
R2	Res., ww, 1,800 ohms ±3%, 3w	DFS18-048	.60
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001	.25

UNIQUE PARTS (Cont)

MODEL LM-E12 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R24	Res., comp., 1,500 ohms ±10%, 2w	DHB1521	$ .24
R25A	Res., ww, one section, 0.30 ohm ±5%, 11w	DFM60-050	1.45
R26A, B	Res., ww, tapped, two sections, A, B, 0.30 ohm ±5%, 11w each section	DFM60-050	1.45
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E12	49.50

MODELS LM-E15 — LM-E60

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003	.33
C4	Cap., elect., 3.0 mfd -10% +75%, 100 vdc	CBN-30-015	1.58
C5	Cap., mylar, 0.018 mfd ±10%, 200 vdc	CGL-18-005	.25
C6+	Same as C5		
C7*	Cap., elect., 140 mfd -10% +100% 38 vdc	CBR-14-030	1.58
C8-C10	Not used		
C11	Cap., mylar, 0.22 mfd ±10%, 200 vdc	CGM-22-002	.41
C12	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK-10-004	.21
C13-C17	Not used		
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40
CR3	Same as CR2		
CR4	Not used		
CR5	Not used		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR2		
CR8 thru CR11	Rectifier	FBL-00-083	3.57
F1+	Fuse, 3AB "NORM-BLO", 10 amperes	FFJ-10-000	.25
F2	Fuse, 4AG "NORM-BLO", 30 amperes	FFE 30-000	.20
Q1	Transistor, NPN	FBN-L110	3.25
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Not used		
Q5+	Transistor, NPN	FBN-L109	2.75
Q7	Not used		
R3	Res., ww, 1,200 ohms ±3%, 2w	DFS-12-030	.90
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30
R5	Res., film, 220 ohms ±2%, 1/2w	DCR-22-005	.30
R6	Res., comp., 180,000 ohms ±10%, 1/2w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/4w	DCB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB-1511	.10
R10	Res., comp., 2,200 ohms ±10%, 1/2w	DEB-2221	.12
R11	Res., comp., 22,000 ohms ±10%, 1/2w	DEB-2231	.12

MODELS LM-E15 — LM-E60 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R12	Res., comp., 47,000 ohms ±10%, 1/2w	DEB-4701	$ .12
R13*	Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
R14	Not used		
R15	Not used		
R16	Res., comp., 470 ohms ±10%, 1/2w	DEB-4711	.12
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2w	DNS-12-026	1.25
R19-R21	Not used		
R22	Res., comp., 330 ohms ±10%, 1/2w	DEB-3311	.12
R23	Res., comp., 22 ohms ±10%, 1/2w	DEB-2201	.12
S1	Thermostat	FKA-142-015	5.00
XF1	Fuseholder	HRM-00-009	.42
XF2	Fuseholder	HRM-00-012	.30

+This part differs on model LM-E60; see LM-E60 unique parts list
*This component not used on units with "Y" option

UNIQUE PARTS

MODEL LM-E15

C3	Cap., elect., 2,100 mfd -10% +100%, 35 vdc	CBS21-043	3.67
C18	Cap., elect., 14,000 mfd -10% +100%, 35 vdc	CBT14-012	12.28
C19	Same as C18		
Q6	Transistor, NPN	FBN36485	4.13
Q8	Transistor, NPN	FBN36485	4.13
Q9-Q12	Same as Q8		
R1	Res., var., ww, 2,200 ohms ±5%, 5w	DNS-22-056	2.50
R2	Res., ww, 1,800 ohms ±3%, 3w	DFS18-048	.60
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001	.25
R24	Res., comp., 2,200 ohms ±10%, 2w	DHB2221	.25
R25A	Res., ww, tapped, one section, 0.47 ohm ±5%, 8w	DFM94-051	3.30
R26A, B	Res., ww, tapped, two sections A, B, 0.47 ohm ±5%, 8w each section	DFM94-051	3.30
R27A, B	Same as R26 A, B		
T1	Transformer	ABA-E15	49.50

MODEL LM-E18

C3	Cap., elect., 2,100 mfd -10% +100%, 35 vdc	CBS21-043	3.67
C18	Cap., elect., 14,000 mfd -10% +100%, 35 vdc	CBT14-012	12.28
C19	Same as C18		
Q6	Transistor, NPN	FBN36220	6.60
Q8	Transistor, NPN	FBN36220	6.60
Q9-Q12	Same as Q8		

UNIQUE PARTS (Cont)

MODEL LM-E18 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS-22-056	$ 2.50
R2	Res., ww, 2,500 ohms, ±3%, 3w	DFS25-036	.53
R18	Res., film, 6,800 ohms ±5%, 1/2w	DCS68-021	.25
R24	Res., comp., 2,200 ohms ±10%, 2w	DHB2221	.25
R25A	Res., ww, tapped, one section, 0.47 ohm ±5%, 8w	DFM94-051	3.30
R26A, B	Res., ww, tapped, two sections A, B, 0.47 ohm ±5%, 8w each section	DFM94-051	3.30
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E18	49.50

MODEL LM-E20

C3	Cap., elect., 1,100 mfd -10% +100%, 60 vdc	CBS11-042	3.67
C18	Cap., elect., 7,800 mfd -10% +100%, 60 vdc	CBS78-045	8.18
C19	Same as C18		
Q6	Transistor, NPN	FBN36220	6.60
Q8	Transistor, NPN	FBN36220	6.60
Q9-Q12	Same as Q8		
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS-22-056	2.50
R2	Res., ww, 2,500 ohms ±3%, 3w	DFS25-036	.53
R18	Res., film, 6,800 ohms ±5%, 1/2w	DCS68-021	.25
R24	Res., comp., 3,300 ohms ±10%, 2w	DHB3321	.13
R25A	Res., ww, tapped, one section, 0.75 ohm ±5%, 8w	DFN15-056	1.50
R26A, B	Res., ww, tapped, two sections A, B, 0.75 ohm ±5%, 8w each section	DFN15-056	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E20	49.50

MODEL LM-E24

C3	Cap., elect., 1,100 mfd -10% +100%, 60 vdc	CBS11-042	3.67
C18	Cap., elect., 7,800 mfd -10% +100%, 60 vdc	CBS78-045	8.18
C19	Same as C18		
Q6	Transistor, NPN	FBN36220	6.60
Q8	Transistor, NPN	FBN36220	6.60
Q9-Q12	Same as Q8		
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS-22-056	2.50
R2	Res., ww, 3,600 ohms, ±3%, 3w	DFS36-050	.60

UNIQUE PARTS (Cont)

MODEL LM-E24 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R18	Res., film, 6,800 ohms ±5%, 1/2w	DCS68-021	$ .25
R24	Res., comp., 3,300 ohms ±10%, 2w	DHB3321	.13
R25A	Res., ww, tapped, one section, 0.75 ohm ±5%, 8w	DFN15-056	1.50
R26A, B	Res., ww, tapped, two sections A, B, 0.75 ohm ±5%, 8w each section	DFN15-056	1.50
R27A, B	Same as R26A, B		
T1	Transformer	ABA-E24	49.50

MODEL LM-E28

C3	Cap., elect., 1,100 mfd -10% +100%, 60 vdc	CBS11-042	3.67
C18	Cap., elect., 7,800 mfd -10% +100%, 60 vdc	CBS78-045	8.18
C19	Same as C18		
Q6	Transistor, NPN	FBN36220	6.60
Q8	Transistor, NPN	FBN36220	6.60
Q9-Q12	Same as Q8		
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS-22-056	2.50
R2	Res., ww, 4,500 ohms, ±3%, 3w	DFS45-044	.87
R18	Res., film, 6,800 ohms ±5%, 1/2w	DCS68-021	.25
R24	Res., comp., 3,300 ohms ±10%, 2w	DHB3321	.13
R25A	Res., ww, tapped, one section, 0.75 ohm ±5%, 8w	DFN15-056	1.50
R26A, B	Res., ww, tapped, two sections A, B, 0.75 ohm ±5%, 8w each section	DFN15-056	1.50
R27A, B	Same as R26 A, B		
T1	Transformer	ABA-E28	49.50

MODEL LM-E36

C3	Cap., elect., 1,100 mfd -10% +100%, 60 vdc	CBS11-042	3.67
C18	Cap., elect., 7,800 mfd -10% +100%, 60 vdc	CBS78-045	8.18
C19	Same as C18		
Q6	Transistor, NPN	FBN36487	5.63
Q8	Transistor, NPN	FBN36487	5.63
Q9-Q12	Same as Q8		
R1	Res., var., ww, 3,300 ohms, ±5%, 5w	DNS-33-057	2.50
R2	Res., ww, 5,600 ohms, ±3%, 3w	DFS56-053	.60
R18	Res., film, 10,000 ohms ±5%, 1/2w	DCT10-008	.25
R24	Res., comp., 3,300 ohms ±10%, 2w	DHB3321	.13
R25A	Res., ww, tapped, one section, 1.5 ohm ±5%, 8w	DFN30-057	2.04

UNIQUE PARTS (Cont)

MODEL LM-E36 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R26A, B	Res., ww, tapped, two sections A, B, 1.5 ohm ±5%, 8w each section	DFN30-057	$ 2.04
R27A, B	Same as R26 A, B		
T1	Transformer	ABA-E36	49.50

MODEL LM-E48

C3	Cap., elect., 400 mfd -10% +100%, 100 vdc	CBR40-044	2.68
C18	Cap., elect., 3,000 mfd -10% +100%, 100 vdc	CBS30-047	11.16
C19	Same as C18		
Q6	Transistor, NPN	FBN36487	5.63
Q8	Transistor, NPN	FBN36487	5.63
Q9-Q12	Same as Q8		
R1	Res., var., ww, 3,300 ohms ±5%, 5w	DNS-33-057	2.50
R2	Res., ww, 8,000 ohms, ±3%, 3w	DFS80-054	1.03
R18	Res., film, 10,000 ohms ±5%, 1/2w	DCT10-008	.25
R24	Res., comp., 4,700 ohms ±10%, 2w	DHB4721	.15
R25A	Res., ww, tapped, one section, 1.5 ohm ±5%, 8w	DFN30-057	2.04
R26A, B	Res., ww, tapped, two sections A, B, 1.5 ohm ±5% 8w each section	DFN30-057	2.04
R27A, B	Same as R26 A, B		
T1	Transformer	ABA-E48	49.50

MODEL LM-E60

C3	Cap., elect., 400 mfd -10 +100%, 100 vdc	CBR-40-044	2.68
C6	Cap., mylar, 0.0068 mfd ±10%, 200 vdc	CGK-68-001	.34
C18	Cap., elect., 3,000 mfd -10 +100%, 100 vdc	CBS-30-047	11.16
C19	Same as C18		
F1	Fuse, 8A, 3AB, NORM-BLO	FFJ-08-000	.35
Q5	Transistor, NPN	FBN-L108	2.25
Q6	Transistor, NPN	FBN-35902	9.90
Q8	Transistor, NPN	FBN-35902	9.90
Q9-Q12	Same as Q8		
R1	Res., var., ww, 4,500 ohms ±5%, 5w	DNS-45-050	2.50
R2	Res., ww, 10,000 ohms ±3%, 5w	DFT-10-042	.65
R18	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30
R24	Res., comp., 5,600 ohms ±10%, 2w	DCS-56-033	.20
R25A	Res., ww, tapped, one section, 1.5 ohms ±5%, 8w	DFN-30-057	2.04
R26A, B	Res., ww, tapped, two sections A, B, 1.5 ohms ±5%, 8w each section	DFN-30-057	2.04

UNIQUE PARTS (Cont)

MODEL LM-E60 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R27A, B	Same as R26A, B		$
T1	Transformer	ABA-E60	49.50

MODELS LM-E100 — LM-E150

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C2	Cap., mylar, 0.15 mfd ±10%, 200 vdc	CGM-15-005	.40
C3	Cap., elect., 200 mfd -10 +100%, 250 vdc	CBR-20-045	2.68
C4	Cap., elect., 3.5 mfd -10 +100%, 300 vdc	CBN-35-018	1.12
C5, C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C7*	Cap., elect., 140 mfd -10 +100%, 38 vdc	CBR-14-030	1.58
C8-C10	Not assigned		
C11	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C12	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK-10-004	.21
C13, C14	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.25
C15-C17	Not assigned		
C18, C19	Cap., elect., 1,200 mfd -10 +100%, 250 vdc	CBS-12-048	11.16
CR1*	Rectifier, zener diode	FBM-Z104	1.35
CR2	Rectifier	FBL-00-030	1.40
CR3	Same as CR2		
CR4, CR5	Not assigned		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR2		
F1	Fuse, 'NORM-BLO", 8A. 3AB	FFJ-08-000	.35
Q1	Transistor, NPN	FBN-L110	3.25
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Not assigned		
Q5	Transistor, NPN	FBN-L108	2.25
Q6	Transistor, NPN	FBN-35903	5.17
Q7	Not assigned		
Q8	Same as Q5		
Q9	Same as Q6		
Q10	Transistor, NPN	FBN-35902	9.90
Q11 Thru Q13	Same as Q10		
R1	Res., var., ww, 9,000 ohms ±5%, 5w	DNS-90-058	2.50
R3	Res., ww, 1,200 ohms ±3%, 2w	DFS-12-030	.90
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30
R5	Res., film, 220 ohms ±2%, 1/2w	DCR-22-005	.30
R6	Res., comp., 180,000 ohms ±10%, 1/2w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/4w	DCB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB-1511	.10

MODELS LM-E100 — LM-E150 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R10	Res., comp., 3,900 ohms ±10%, 1/2w	DEB-3921	$ .12
R11	Res., comp., 22,000 ohms ±10%, 1/2w	DEB-2231	.12
R12	Res., comp., 47 ohms ±10%, 1/2w	DEB-4701	.12
R13*	Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
R14, R15	Not assigned		
R16	Res., comp., 1,200 ohms ±10%, 1/2w	DEB-1221	.12
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2w	DNS-12-026	1.25
R19 Thru R21	Not assigned		
R22	Res., comp., 330 ohms ±10%, 1/2w	DEB-3311	.12
R23	Res., comp., 56 ohms ±10%, 1/2w	DEB-5601	.12
R27	Not assigned		
R28, R29	Res., comp., 68 ohms ±10%, 1/2w	DEB-6801	.12
R30 Thru R35	Not assigned		
R38, R39	Not assigned		
R40	Res., film, 33,000 ohms ±10%, 2w	DCT-33-023	.20
R41 Thru R46	Not assigned		
R47	Same as R22		
S1	Thermostat	FKA-142-015	5.00
XF1	Fuseholder	HRM-00-009	.12
XF2	Fuseholder	HRM-00-012	.30

*This part not used on units with "Y" option

UNIQUE PARTS

MODEL LM-E100

CR8	Rectifier	FBL-00-065	1.15
CR9 Thru CR11	Same as CR8		
F2	Fuse, 5A, 4AG, NORM-BLO	FFE-05-000	.25
R2	Res., ww, 16,000 ±3%, 5w	DFT-16-039	.85
R18	Res., film, 39,000 ohms ±5%, 1/2w	DCT-39-015	.30
R24	Res., film, 22,000 ohms ±10%, 2w	DCT-22-020	.20
R25, R26	Res., ww, 1.0 ohms ±3%, 3w	DFN-10-041	.66
R36, R37	Res., ww, 8,000 ohms ±3%, 3w	DFS-80-054	1.03
T1	Transformer	ABA-E100	49.50

MODEL LM-E120

CR8	Rectifier	FBL-00-065	1.15
CR9 Thru CR11	Same as CR8		
F2	Fuse, 5A, 4AG, NORM-BLO	FFE-05-000	.25
R2	Res., ww, 20,000 ohms ±3%, 5w	DFT-20-040	.85

UNIQUE PARTS (Cont)

MODEL LM-E120 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R18	Res., film, 43,000 ohms ±5%, 1/2w	DCT-43-016	$ .30
R24	Res., film, 22,000 ohms ±10%, 2w	DCT-22-020	.20
R25, R26	Res., ww, 1.5 ohms ±3%, 3w	DFN-15-042	.60
R36, R37	Res., ww, 8,000 ohms ±3%, 3w	DFS-80-054	1.03
T1	Transformer	ABA-E120	49.50

MODEL LM-E150

CR8	Rectifier	FBL-00-066	1.45
CR9 Thru CR11	Same as CR8		
F2	Fuse, 3A, 4AG, NORM-BLO	FFE-03-000	.25
R2	Res., ww, 26,000 ohms ±3%, 5w	DFT-26-041	1.20
R18	Res., film, 56,000 ohms ±5%, 1w	DCT-56-017	.25
R24	Res., film, 27,000 ohms ±10%, 2w	DCT-27-021	.20
R25, R26	Res., ww, 1.5 ohms ±3%, 3w	DFN-15-042	.60
R36, R37	Res., ww, 10,000 ohms ±3%, 5w	DFT-10-042	.65
T1	Transformer	ABA-E150	49.50

MODELS LME-0-14, LME-0-32, LME-0-60

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003	.33
C4	Cap., elect., 3.0 mfd -10 +75%, 100 vdc	CBN-30-015	1.58
C6	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.25
C7*	Cap., elect., 140 mfd -10 +100%, 38 vdc	CBR-14-030	1.58
C9	Cap., mylar, 0.22 mfd ±10%, 200 vdc	CGM-22-002	.41
C10, C11	Not assigned		
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40
CR3 Thru CR5	Not assigned		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR2		
CR13, CR14	Not assigned		
CR16, CR17	Not assigned		
CR18, CR19	Same as CR2		
F1	Fuse, "SLO-BLO", 6.25A, 3AG	FFC-06-250	.21
Q1	Transistor, NPN	FBN-L110	3.25
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Not assigned		
Q7	Not assigned		
Q14 Thru Q27	Not assigned		

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R2	Not assigned		$
R3	Res., ww, 1,100 ohms ±3%, 2w	DFS-11-061	.60
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30
R5	Res., film, 220 ohms ±2%, 1/2w	DCR-22-005	.30
R6	Res., comp., 180,000 ohms ±10%, 1/2w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/4w	DCB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB-1511	.10
R10	Res., comp., 2,200 ohms ±10%, 1/2w	DEB-2221	.12
R11, R12	Not assigned		
R13*	Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
R14, R15	Not assigned		
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2w	DNS-12-026	1.26
R18 Thru R21	Not assigned		
R22	Res., comp., 1,200 ohms ±10%, 1/2w	DEB-1221	.12
R23	Res., comp., 22 ohms ±10%, 1/2w	DEB-2201	.12
R24	Not assigned		
R31 Thru R42	Not assigned		
R43	Res., comp., 1,000 ohms ±10%, 1/2w	DEB-1021	.12
R46	Res., comp., 47 ohms ±5%, 1/2w	DEB-4705	.24
S1	Thermostat	FKA-142-015	5.00
XF1	Fuseholder	HRM-00-009	.12
XF2	Fuseholder	HRM-00-012	.30

*This part not used on units with "Y" option

UNIQUE PARTS

MODEL LME-0-14

C3	Cap., elect., 2,100 mfd -10 +100%, 35 vdc	CBS-21-043	3.67
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C8	Cap., elect., 14,000 mfd -10 +100%, 35 vdc	CBT-25-011	12.28
C12	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK-10-004	.21
CR8	Rectifier	FBL-00-054	1.35
CR9 Thru CR11	Same as CR8		
CR12	Rectifier	FBL-00-083	3.57
CR15	Not assigned		
F2	Fuse, 20A, 4AG, NORM-BLO	FFE-20-000	.25
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q8	Transistor, NPN	FBN-36485	4.13

UNIQUE PARTS (Cont)

MODEL LME-0-14 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
Q9 Thru Q13	Same as Q8		$
Q28	Transistor, NPN	FBN-L148	2.75
R1	Res., var., ww, 3,300 ohms ±5%, 5w	DNS-33-057	2.50
R16	Res., comp., 470 ohms ±10%, 1/2w	DEB-4711	.12
R25 Thru R30	Res., ww, 0.75 ohms ±5%, 5w	DFM-75-044	.82
R44	Res., comp., 2,200 ohms ±10%, 1/2w	DEB-2221	.12
R45	Res., film, 820 ohms ±5%, 1w	DCR-82-018	.60
T1	Transformer	ABA-E-014	34.00

MODEL LME-0-32

C3	Cap., elect., 1,100 mfd -10 +100%, 60 vdc	CBS-11-042	3.67
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C8	Cap., elect., 7,800 mfd -10 +100%, 60 vdc	CBS-78-045	8.18
C12	Not assigned		
CR8	Rectifier	FBL-00-054	1.35
CR9 Thru CR11	Same as CR8		
CR12	Rectifier	FBL-00-083	3.57
CR15	Not assigned		
F2	Fuse, 10A, 4AG, NORM-BLO	FFE-10-000	.25
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36488	3.75
Q8	Transistor, NPN	FBN-36487	5.63
Q9 Thru Q13	Same as Q8		
Q28	Transistor, NPN	FBN-L148	2.75
R1	Res., var., ww, 9,000 ohms ±5%, 5w	DNS-90-058	2.50
R16	Res., comp., 430 ohms ±10%, 1/2w	DEB-4711	.12
R25 Thru R30	Res., ww, 3.0 ohms ±3%, 3w	DFN-30-023	.59
R44	Res., comp., 4,700 ohms ±10%, 2w	DHB-4721	.15
R45	Res., ww, 2,000 ohms ±3%, 3w	DFS-20-032	.87
T1	Transformer	ABA-E-032	34.00

MODEL LME-0-60

C3	Cap., elect., 400 mfd -10 +100%, 100 vdc	CBR-40-044	2.68
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C8	Cap., elect., 3,000 mfd -10 +100%, 100 vdc	CBS-30-047	11.16
C12	Not assigned		
CR8	Rectifier	FBL-00-054	1.35
CR9 Thru CR11	Same as CR8		

UNIQUE PARTS (Cont)

MODEL LME-0-60 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
CR12	Not assigned		
CR15	Rectifier	FBL-00-065	$ 1.15
F2	Fuse, 5A, 4AG, NORM-BLO	FFE-05-000	.25
Q5	Transistor, NPN	FBN-L108	2.25
Q6	Transistor, NPN	FBN-35903	5.17
Q8	Transistor, NPN	FBN-35902	9.90
Q9 Thru Q13	Same as Q8		
Q28	Same as Q5		
R1	Res., var., ww, 13,000 ohms ±5%, 5w	DNT-13-032	5.75
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB-8211	.12
R25 Thru R30	Res., ww, 3.0 ohms ±3%, 3w	DFN-30-023	.59
R44, R45	Res., ww, 4,500 ohms ±3%, 3w	DFS-45-044	.87
T1	Transformer	ABA-E-060	34.00

PARTS FOR MODEL LME-0-7

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003	.33
C3	Cap., elect., 3,600 ohms -10 +100%, 20 vdc	CBS-36-044	2.36
C4	Cap., elect., 3.0 mfd -10 +75%, 100 vdc	CBN-30-015	1.58
C5, C6	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.25
C7*	Cap., elect., 140 mfd -10 +100%, 38 vdc	CBR-14-030	1.58
C8	Cap., elect., 25,000 mfd -10 +100%, 20 vdc	CBT-25-011	12.28
C9, C10	Cap., mylar, 0.22 mfd ±10%, 200 vdc	CGM-22-002	.41
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40
CR3 Thru CR5	Not assigned		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR2		
CR8	Rectifier	FBL-00-054	1.35
CR9	Not assigned		
CR10	Same as CR8		
CR11	Not assigned		
CR12	Rectifier	FBL-00-083	3.57
F1	Fuse, "SLO-BLO", 6.25A, 3AG	FFC-06-250	.21
F2	Fuse, 30A, 4AG, NORM-BLO	FFE-30-000	.20
Q1	Transistor, NPN	FBN-L110	3.25
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Not assigned		
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q7	Not assigned		
Q8	Transistor, NPN	FBN-36485	4.13
Q9 Thru Q13	Same as Q8		
R1	Res., var., ww, 2,200 ohms ±5%, 5w	DNS-22-056	2.50

PARTS FOR MODEL LME-0-7 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R2	Not assigned		
R3	Res., ww, 1,100 ohms ±3%, 2w	DFS-11-061	$ .60
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30
R5	Res., film, 220 ohms ±2%, 1/2w	DCR-22-005	.30
R6	Res., comp., 180,000 ohms ±10%, 1/2w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/2w	DEB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB-1511	.10
R10	Res., comp., 2,200 ohms ±10%, 1/2w	DEB-2221	.12
R11, R12	Not assigned		
R13*	Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
R14, R15	Not assigned		
R16	Res., comp., 470 ohms ±10%, 1/2w	DEB-4711	.12
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2w	DNS-12-026	1.25
R18, R19	Not assigned		
R20	Res., ww, 100 ohms ±3%, 10w	DFR-10-056	1.05
R21	Not assigned		
R22	Res., comp., 1,200 ohms ±10%, 1/2w	DEB-1221	.12
R23	Res., comp., 22 ohms ±10%, 1/2w	DEB-2201	.12
R24	Not assigned		
R25A, B Thru R27A, B	Res., ww, center tapped, 0.47 ohms ±5%, 8w section	DFM-94-051	3.30
S1	Thermostat	FKA-142-015	5.00
T1	Transformer	ABA-E-07	34.00
XF1	Fuseholder	HRM-00-009	.12
XF2	Fuseholder	HRM-00-012	.30

*This part not used on units with "Y" option

PARTS FOR "MP" OPTION MODELS MP-5, P-5

DS1	Pilot light assembly (ALL)	HRD 00-007	.83
F1	Fuse, 3 AG, "SLO-BLO", 5 amperes (LM-E3 thru LM-E4)	FFC 05-000	.18
F1	Fuse, 3 AG, "SLO-BLO", 7 amperes (LM-E4P5, E5, E6)	FFC 07-000	.21
F1	Fuse, 3 AG, "SLO-BLO", 8 amperes (LM-E8 thru LM-E12. LM-E60 thru LM-E150)	FFC 08-000	.21
F1	Fuse, 3 AG, "SLO-BLO", 10 amperes (LM-E15 thru LM-E48)	FFC 10-000	.21
F1	Fuse, 3 AG, "SLO-BLO", 6.25 amperes (LME-0-7 thru LME-0-60)	FFC-06-250	.21
XF1	Fuseholder (ALL)	HRK 00-005	.50
M1*	Meter, volts, D.C., 0-5 vdc (LM-E3 thru LM-E4P5)	EBN 50-003	14.40

PARTS FOR "MP" OPTION (Cont)

MODELS MP-5, P-5 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
M1*	Meter, volts, D.C., 0-8 vdc (LM-E5, LM-E6, E0-7)	EBN 80-005	$ 12.00
M1*	Meter, volts, D.C., 0-10 vdc (LM-E8)	EBP 10-016	18.00
M1*	Meter, volts, D.C., 0-15 vdc (LM-E10, LM-E12, E0-14)	EBP 15-017	18.00
M1*	Meter, volts, D.C., 0-20 vdc (LM-E15, LM-E18)	EBP 20-014	18.00
M1*	Meter, volts, D.C., 0-25 vdc (LM-E20)	EBP 25-018	18.00
M1*	Meter, volts, D.C., 0-40 vdc (LM-E24, E28, E36, E0-32)	EBP 40-013	18.00
M1*	Meter, volts, D.C., 0-60 vdc (LM-E48, E0-60)	EBP 60-015	18.00
M1*	Meter, volts, D.C., 0-80 vdc (LM-E60)	EBP 80-019	18.00
M1*	Meter, volts, D.C., 0-120 vdc (LM-E100)	EBR 12-075	18.00
M1*	Meter, volts, D.C., 0-150 vdc (LM-E120)	EBR 15-076	18.00
M1*	Meter, volts, D.C, 0-200 vdc (LM-E150)	EBR 20-077	18.00
M2*	Meter, amperes, D.C. 0-20 amperes LM-E3 thru LM-E10	EDP 20-015	18.00
M2*	Meter, amperes, D.C, 0-1.5 amperes LM-E150	EDN-15-020	18.00
M2*	Meter, amperes, D.C, 0-2 amperes LM-E100, 120	EDN 20-022	18.00
M2*	Meter, amperes, D.C, 0-15 amperes LM-E12 thru E-24, E-0-7	EDP 15-014	18.00
M2*	Meter, amperes, D.C., 0-10 amperes LM-E28 E36, E0-14	EDP 10-013	18.00
M2*	Meter, amperes, D.C., 0-3 amperes LME-0-60	EDN 30-019	18.00
M2*	Meter, amperes, D.C. 0-6 amperes LM-E48	EDN 60-018	18.00
M2*	Meter, amperes, D.C. 0-5 amperes LM-E60, LME-0-32	EDN 50-021	18.00
R1	Res., var., ww, 300 ohms ±5%, 5w LM-E3	DNR 30-018	1.95
R1	Res., var., ww, 600 ohms ±5%, 5w LM-E3P3 thru LM-E6	DNR-60-026	2.50
R1	Res., var., ww, 1,000 ohms ±5%, 5w LM-E8	DNS 10-032	1.95
R1	Res., var., ww, 2,200 ohms ±5%, 5w LM-E10 thru LM-E28 LME-0-7	DNS-22-053	2.50
R1	Res., var., ww, 3,300 ohms ±5%, 5w LM-E36, LM-E48, LME-0-14	DNS-33-054	2.50
R1	Res., var., ww, 13,000 ohms ±5%, 5w LME-0-60	DNT-13-031	2.50
R1	Res., var., ww, 4,500 ohms ±5%, 5w LM-E60	DNS-45-059	2.50
R1	Res., var., ww, 9,000 ohms 5%, 5w LM-E100 LM-E150, LME-0-32	DNS-90-051	2.50

*This part only used on MP-5

PARTS FOR "MP" OPTION (Cont)

MODELS MP-5, P-5 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
S1	Switch, SPST ALL	FDA 11-017	$ 2.50
C1, C2	Cap., Tant., 2.5 mfd -15 + 75%, 100 vdc. ALL	CBN-25-010	1.80

PARTS FOR "MP" OPTION WITH "R" OPTION

Variable resistor R1 changes on all "P" and "MP" panels with suffix "R". Part no. changes for R1 are listed here.

R1	Res., var., ww, 300 ohms ±5%, 5w (LM-E3)	DNR-30-031	6.25
R1	Res., var., ww 600 ohms ±5%, 5w (LM-E3P3 thru LM-E6)	DNR-60-032	6.25
R1	Res., var., ww, 1,000 ohms ±5%, 5w (LM-E8)	DNS-10-069	6.25
R1	Res., var., ww, 2,200 ohms ±5%, 5w (LM-E10 thru LM-E28, LME-0-7)	DNS-22-070	6.25
R1	Res., var., ww, 3,300 ohms ±5%, 5w (LM-E36, LM-E48, LME-0-14)	DNS-33-071	6.25
R1	Res., var., ww, 4,500 ohms ±5%, 5w (LM-E60)	DNS-45-072	6.25
R1	Res., var., ww, 9,000 ohms ±5%, 5w (LM-E100 thru LM-E150, LME-0-32)	DNS-90-068	6.25
R1	Res., var., ww. 13,000 ohms ±5%, 5w (LME-0-60)	DNS-13-035	6.35

PARTS FOR "OV" OPTION

MODELS LMOV-1, -2, -3

COMMON PARTS

C1	Cap., mylar, 0.01 mfd ±20%, 80 vdc	CGL-10-008	.50
Q1	Transistor, NPN	FBN-L102	2.40
R3	Res., film, 200 ohms ±5%, 1/2w	DCR-20-010	.20
R4	Res., thermistor, 425 ohms ±5%, 1-1/4w	DKR-43-004	1.52
R5	Res., comp., 1,200 ohms ±10%, 1/2w	DEB-1221	.12
R6	Same as R5		
R8	Res., comp., 15,000 ohms ±10%, 1/2w	DEB-1531	.12
R10	Same as R5		
SCR1	Rectifier, silicon, controlled	FBP-00-009	6.00

UNIQUE PARTS

MODEL LMOV-1

Q2	Transistor, PNP	FBN-L103	1.76
R1	Res., var., ww, 2,000 ohms ±10%. 1w	DNS-20-034	3.00
R2	Res., film, 560 ohms ±2%, 1/2w	DCR-56-002	.65
R7	Res., comp., 33 ohms ±5%, 1/4w	DCB-3305	.15
R9	Not used		

RC. SIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
	MODEL LMOV-2		
2	Transistor, PNP	FBN-L103	1.76
1	Res., var., ww, 5,000 ohms ±10%, 1w	DNS-50-036	3.15
2	Res., film, 1,470 ohms ±1%, 1/2w	DCS-15-031	.30
7	Res., comp., 33 ohms ±5%, 1/4w	DCB-3305	.15
9	Not used		
	MODEL LMOV-3		
2	Transistor, PNP	FBN-L114	3.50
1	Res., var., ww, 20,000 ohms ±10%, 1w	DNT-20-010	3.25
2	Res., film, 4,700 ohms ±2%, 1/2w	DCS-47-028	.30
7	Res., comp., 39 ohms ±5%, 1/4w	DCB-3905	.15
9	Res., comp., 22 ohms ±10%, 1/2w	DEB-2201	.12
	PARTS FOR "Y" OPTION		
107	Cap., elect., 40 mfd 35 vdc	CBP-40-014	$ 1.68
R1	Rectifier, zener diode	FBM-Z107	3.75
R101	Rectifier, zener diode	FBM-Z104	4.35
101	Transistor NPN	FBN-L109	2.75
1	Res., comp., 220,000 ±10%, 1/2w	DEB-2241	.12
101	Res., film, 6,800 ohms ±2%, 1/4w	DCS-68-032	.30
102	Res., film, 220 ohms ±2%, 1/4w	DCR-22-014	.30
	PARTS FOR "T" OPTION		
n all "E" package models with suffix "T", capacitor C1, fuse F1, nd transformer T1 change and a resistor is added in series with S-1 on "MP" option. Part no. changes for C1, F1, and DS-1 Res re listed here. For transformer T1 used on these models, see andard "E" model parts list for the standard transformer part o. and add suffix "T" to the part no. Price for T1 does not change			
	ALL MODELS		
1	Cap., mylar, 0.033 mfd ±10%, 600 vdc	CGL-33-014	.35
S1-Res.	Res., comp., 120K ±10%	DEB-1241	.12
	MODELS LM-0-7, 0-14, 0-32, 0-60 LM-E3 THRU LM-E6		
1	Fuse, "Slo-Blo", 3.0 amps, 250V , 3AB	FFG-03-000	.25
	MODELS LM-E8, E10		
1	Fuse, "Slo-Blo", 4.0 amps, 250V , 3AB	FFG-04-000	.25
	MODELS LM-E12, E15 LM-E60 THRU LM-E150		
F1	Fuse, "Slo-Blo", 5.0 amps, 250V	FFG-05-000	.25
	MODELS LME18 THRU LME48		
F1	Fuse, "Slo-Blo", 6.25 amperes 250V	FFG-06-250	.25

PARTS FOR "V" OPTION

All "E" package models with the "V" option have the same part changes as listed for the "T" option except for capacitor C1 and transformer T1 listed below

C1	Cap., paper, 0.01 mfd ±10%, 1000 vdc	CAL-10-021	1.95
T1	Transformer	Add "G*" suffix to Reg. T1 No.	Same as Reg. T1

* Suffix "V" on units with serial no. prefixes A & B.

PARTS FOR "R" OPTION

Variable resistor R1 and transformer T1 change on all "E" package models with suffix "R". Part no. changes for R1 are listed here. For transformer T1 used on these models see standard "E" model parts lists for the standard transformer part no. and add suffix "R" to the part no. Price for T1 does not change.

	MODEL LM-E3		
R1	Res., var., ww, 300 ohms ±5%, 5w	DNR-30-029	$ 6.25
	MODELS LM-E3P3—LM-E6		
R1	Res., var., ww, 600 ohms ±5%, 5w	DNR-60-030	6.25
	MODEL LM-E8		
R1	Res., var., ww, 1000 ohms ±5%, 5w	DNS-10-064	6.25
	MODELS LM-E10—LM-E28, LME-0-7		
R1	Res., var., ww, 2200 ohms ±5%, 5w	DNS-22-065	6.25
	MODELS LM-E36, LM-E48, LME-0-14		
R1	Res., var., ww, 3300 ohms ±5%, 5w	DNS-33-066	6.25
	MODEL LM-E60		
R1	Res., var., ww, 4500 ohms ±5%, 5w	DNS-45-067	6.25
	MODELS LM-E100—LM-E150, LME-0-32		
R1	Res., var., ww, 9000 ohms ±5%, 5w	DNS-90-068	6.25
	MODEL LME-0-60		
R1	Res., var., ww, 13000 ohms ±5%, 5w	DNT-13-035	6.25

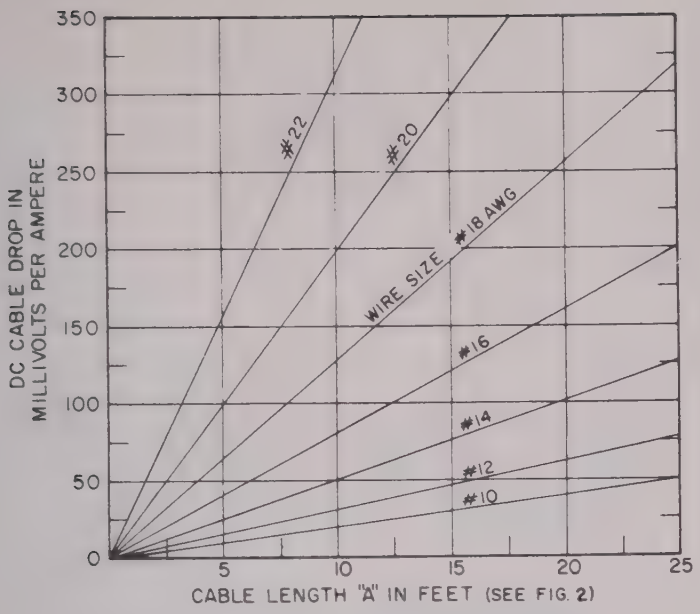


Figure 1. Cable Connection Chart

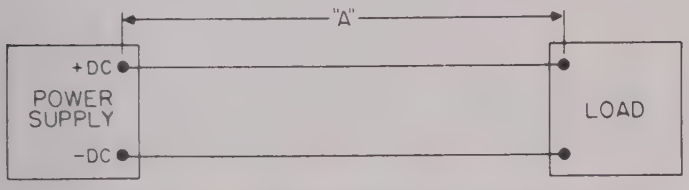
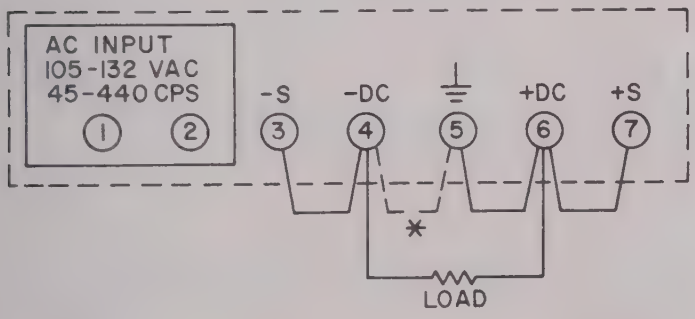
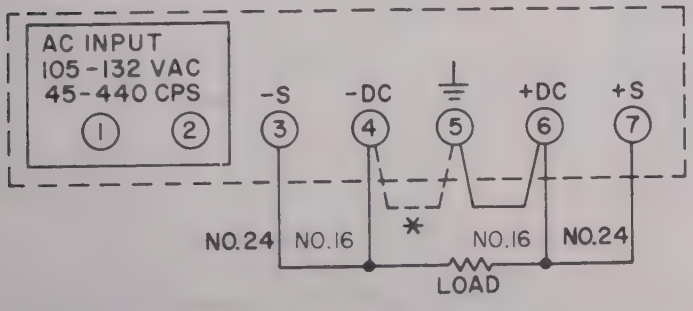


Figure 2. Cable Length "A" in Feet



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

Figure 3. Local Sensing Connections



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

Figure 4. Remote Sensing Connections

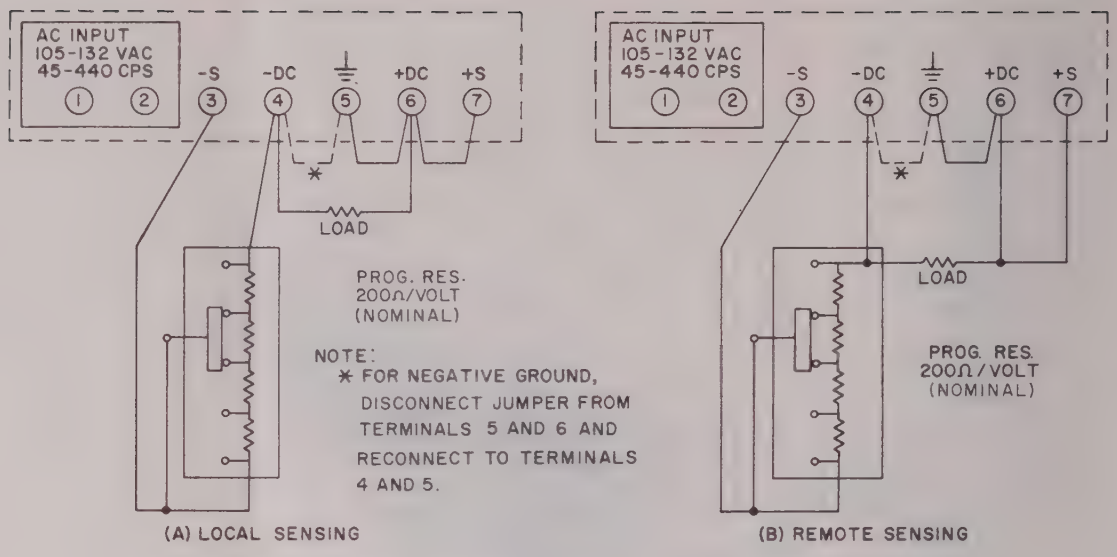


Figure 5. Programmed Voltage, with External Resistor

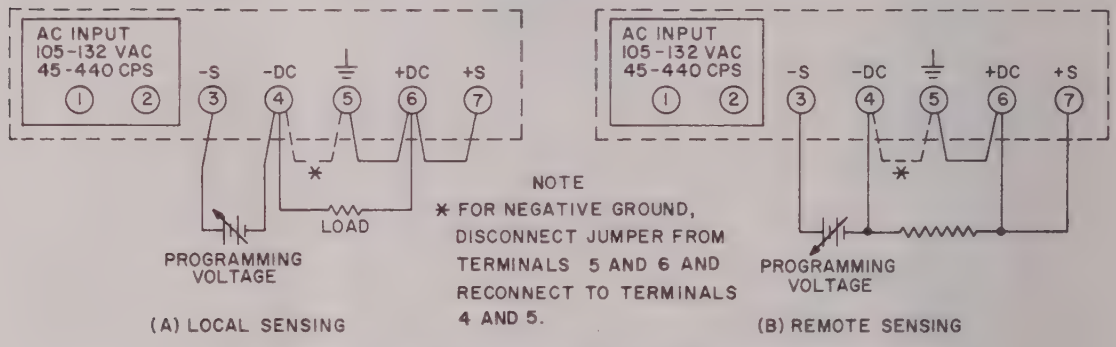


Figure 6. Programmed Voltage, with External Programming Voltage Source

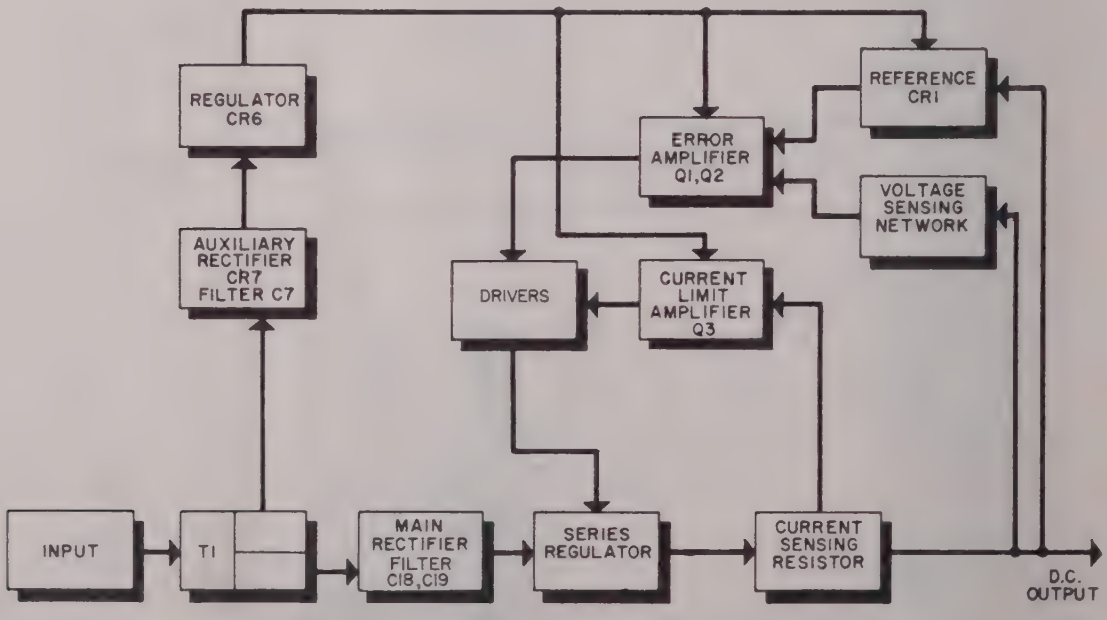


Figure 7. Typical Block Diagram

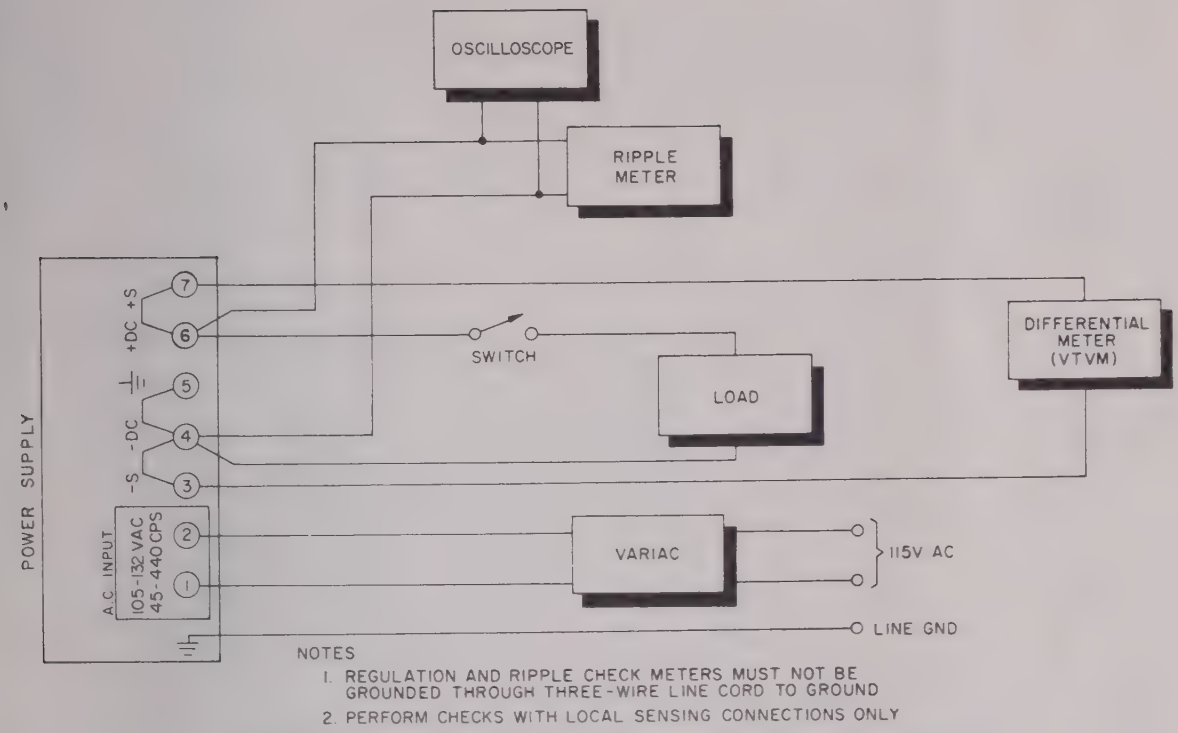


Figure 8. Test Connections for Performance Checks

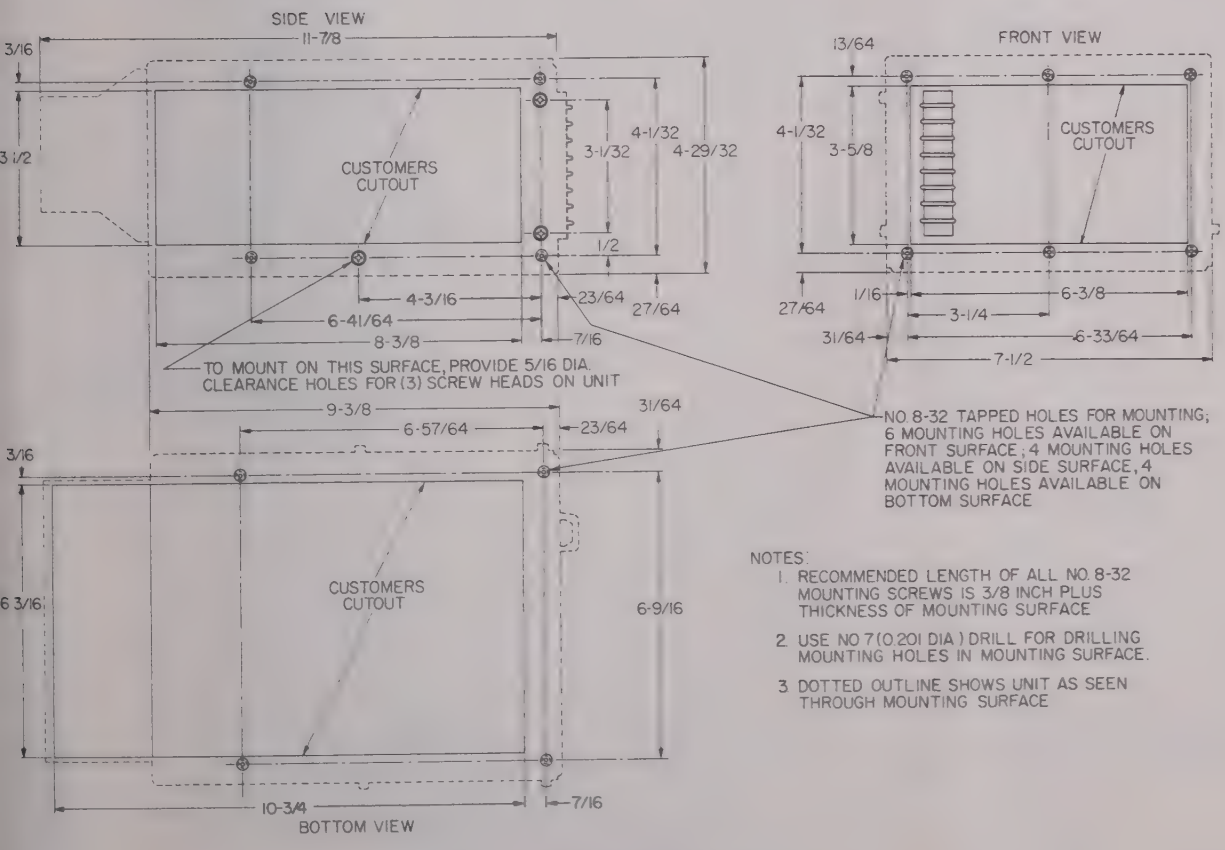
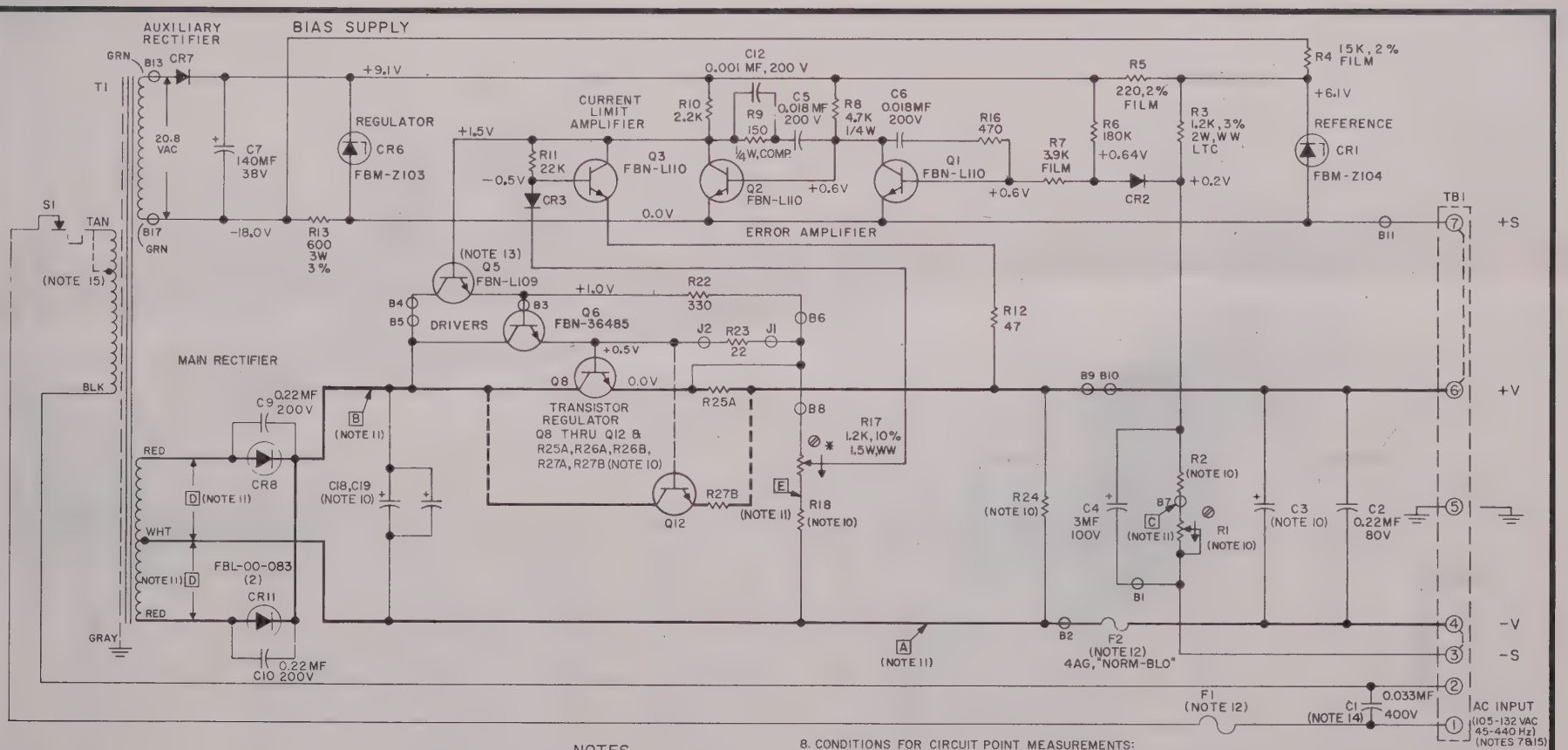

SIDE VIEW
FRONT VIEW
BOTTOM VIEW
CUSTOMERS CUTOUT
TO MOUNT ON THIS SURFACE, PROVIDE 5/16 DIA. CLEARANCE HOLES FOR (3) SCREW HEADS ON UNIT
NO. 8-32 TAPPED HOLES FOR MOUNTING; 6 MOUNTING HOLES AVAILABLE ON FRONT SURFACE; 4 MOUNTING HOLES AVAILABLE ON SIDE SURFACE, 4 MOUNTING HOLES AVAILABLE ON BOTTOM SURFACE
NOTES:
1. RECOMMENDED LENGTH OF ALL NO. 8-32 MOUNTING SCREWS IS 3/8 INCH PLUS THICKNESS OF MOUNTING SURFACE
2. USE NO 7 (0.201 DIA.) DRILL FOR DRILLING MOUNTING HOLES IN MOUNTING SURFACE.
3. DOTTED OUTLINE SHOWS UNIT AS SEEN THROUGH MOUNTING SURFACE

Figure 9. Recommended Mounting Cutouts



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B" OR TERMINAL BOARD "J".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C CURRENT RATING FOR 45-55 Hz; FOR 360-440 Hz, SEE INSTRUCTION MANUAL.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz ; OUTPUT: NOM'L. VDC NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. SEE TABLE I FOR FUSE RATINGS.
13. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
14. ON UNITS WITH "V" OPTION, C1 IS 0.01MF ±10%, 1000V, PAPER.
15. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A & B, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.

REFERENCE DESIGNATIONS NOT USED	
Q4	
Q7	CR10
C8	R14
C11	R15
C13-C17	R19
	R20
CR4,5	R21

MODELS	MODELS
	LM-E5
LM-E3	LM-E6
LM-E3P3	LM-E8
LM-E3P6	
LM-E4	LM-E10
LM-E4P5	LM-E12

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-C

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

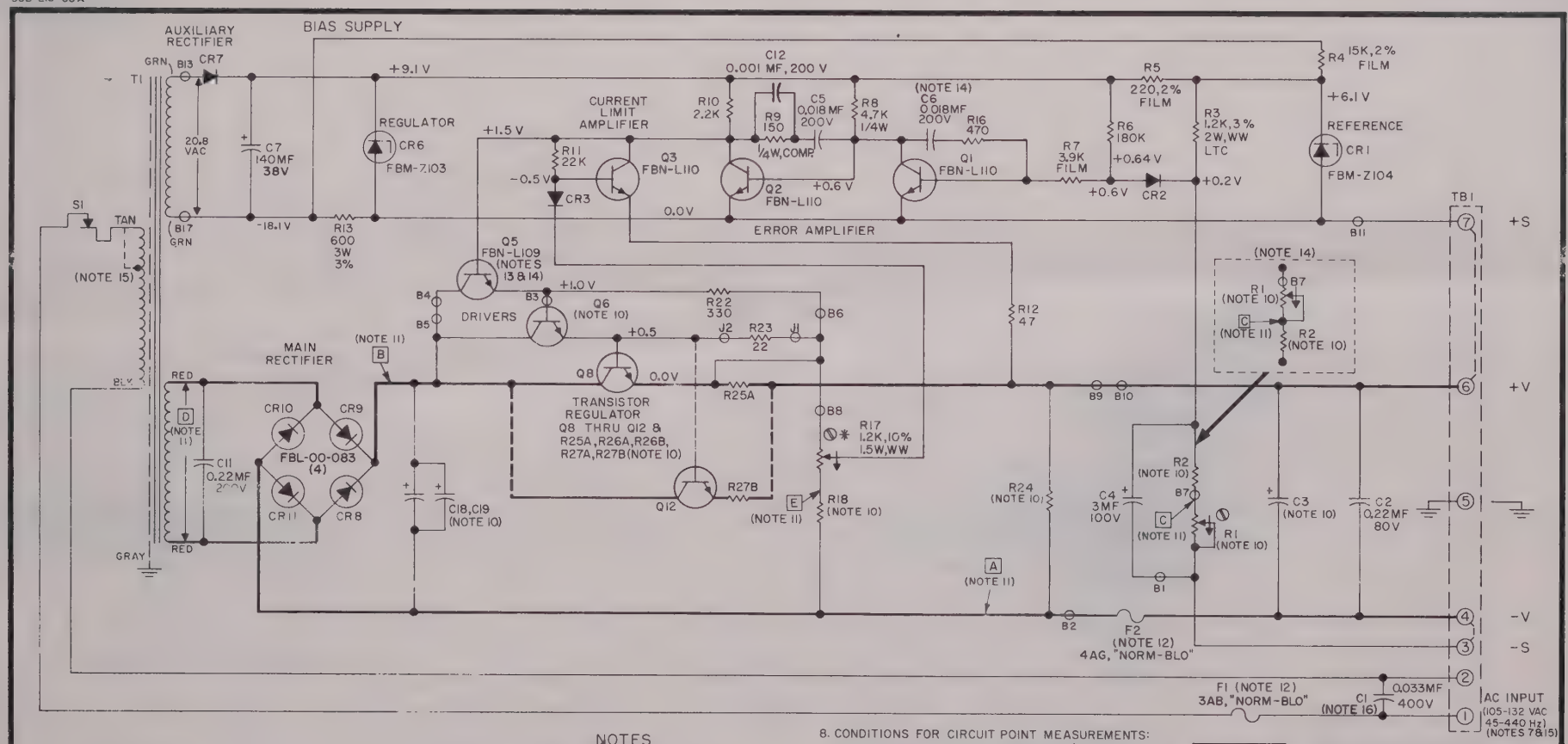
A
LAMBDA
ELECTRONICS CORP.
MELVILLE NEW YORK

TABLE I

DATA REFERENCES FOR MODELS LM-E3 – LM-E12

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement					Schematic Components									
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	C3	C18, C19	Q8-Q12 (FBN-)	R1 ±5% 5W	R2 ±3% 3W	R18 ±5% 1/2W	R24 ±10%	R25A, R26A, R27A R26B, R27B	F1* (AMPS)	F2 (AMPS)
LM-E3	3±5%	22.0	20.0	16.5	10.0	-3.0	+6.2	-2.0	7.2	-3.0	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	300	430	JUMPER	330 1W	0.10±5%, 11W	5, 3AG, SLO-BLO (3, 3AB)	40
LM-E3P3	3.3±5%	21.0	19.0	16.5	10.0	-3.3	+7.3	-2.2	8.2	-3.3	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	600	430	JUMPER	680 2W	0.10±5%, 11W	5, 3AG, SLO-BLO (3, 3AB)	40
LM-E3P6	3.6±5%	21.0	19.0	16.5	10.0	-3.6	+7.0	-2.2	8.2	-3.6	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	600	430	JUMPER	680 2W	0.10±5%, 11W	5, 3AG, SLO-BLO (3, 3AB)	40
LM-E4	4±5%	21.0	19.0	16.5	10.0	-4.0	+6.6	-3.0	8.2	-4.0	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	600	600	JUMPER	680 2W	0.10±5%, 11W	5, 3AG, SLO-BLO (3, 3AB)	40
LM-E4P5	4.5±5%	20.0	18.0	16.4	10.0	-4.5	+7.6	-2.8	9.3	-3.4	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	600	650	390	680 2W	0.10±5%, 11W	7, 3AG, SLO-BLO (3, 3AB)	40
LM-E5	5±5%	20.0	18.0	16.4	10.0	-5.0	+7.1	-2.8	9.3	-2.4	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	600	650	1300	680 2W	0.10±5%, 11W	7, 3AG, SLO-BLO (3, 3AB)	40
LM-E6	6±5%	19.0	17.3	15.6	10.0	-6.0	+7.5	-3.8	10.2	-2.9	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36972	600	800 2W	1300	680 2W	0.10±5%, 11W	7, 3AG, SLO-BLO (3, 3AB)	40
LM-E8	8±5%	18.0	16.4	14.7	10.0	-8.0	+9.9	-5.8	13.4	-2.7	3600MF, 20V 35V SURGE	25000MF, 20V 30V SURGE	36485	1000	1200 2W	2400	1500 2W	0.18±5%, 11W	8, 3AB, NORM-BLO (4, SLO-BLO)	40
LM-E10	10±5%	16.0	14.5	13.0	9.5	-10.0	+10.8	-5.8	15.4	-3.3	2100MF, 35V 60V SURGE	14000MF, 35V 60V SURGE	36485	2200	1200 2W	2400	1500 2W	0.30±5%, 11W	8, 3AB, NORM-BLO (4, SLO-BLO)	30
LM-E12	12±5%	15.0	13.6	12.3	9.5	-12.0	+10.2	-8.8	16.4	-4.0	2100MF, 35V 60V SURGE	14000MF, 35V 60V SURGE	36485	2200	1800	2400	1500 2W	0.30±5%, 11W	8, 3AB, NORM-BLO (5, SLO-BLO)	30

* Fuse ratings in parenthesis apply to units with "V" option.



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - ♦ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▭ INDICATES ACTUAL UNIT MARKING
   - ✱ SEE INSTRUCTION MANUAL.
   - ⊣▶⊢ LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - ⊖ INDICATES TERMINAL ON PRINTED WIRING BOARD "B" OR TERMINAL BOARD "J".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C CURRENT RATING FOR 45-55Hz; FOR 360-440Hz, SEE INSTRUCTION MANUAL.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz ; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. SEE TABLE I FOR FUSE RATING.
13. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
14. ON MODEL LM-E60, C6 IS 0.0068 MF, Q5 IS FBN-L108, R1 AND R2 ARE CONNECTED AS SHOWN.
15. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A & B, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
16. ON UNITS WITH "V" OPTION, C1 IS 0.01MF±10%, 1000V, PAPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
Q4	R15
CR4	R19-R21
CR5	
C8-C10	
C13-C17	

MODELS
LM-E15
LM-E18
LM-E20
LM-E24
LM-E28
LM-E36
LM-E48
LM-E60

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

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THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-C

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA ELECTRONICS CORP.
MELVILLE NEW YORK

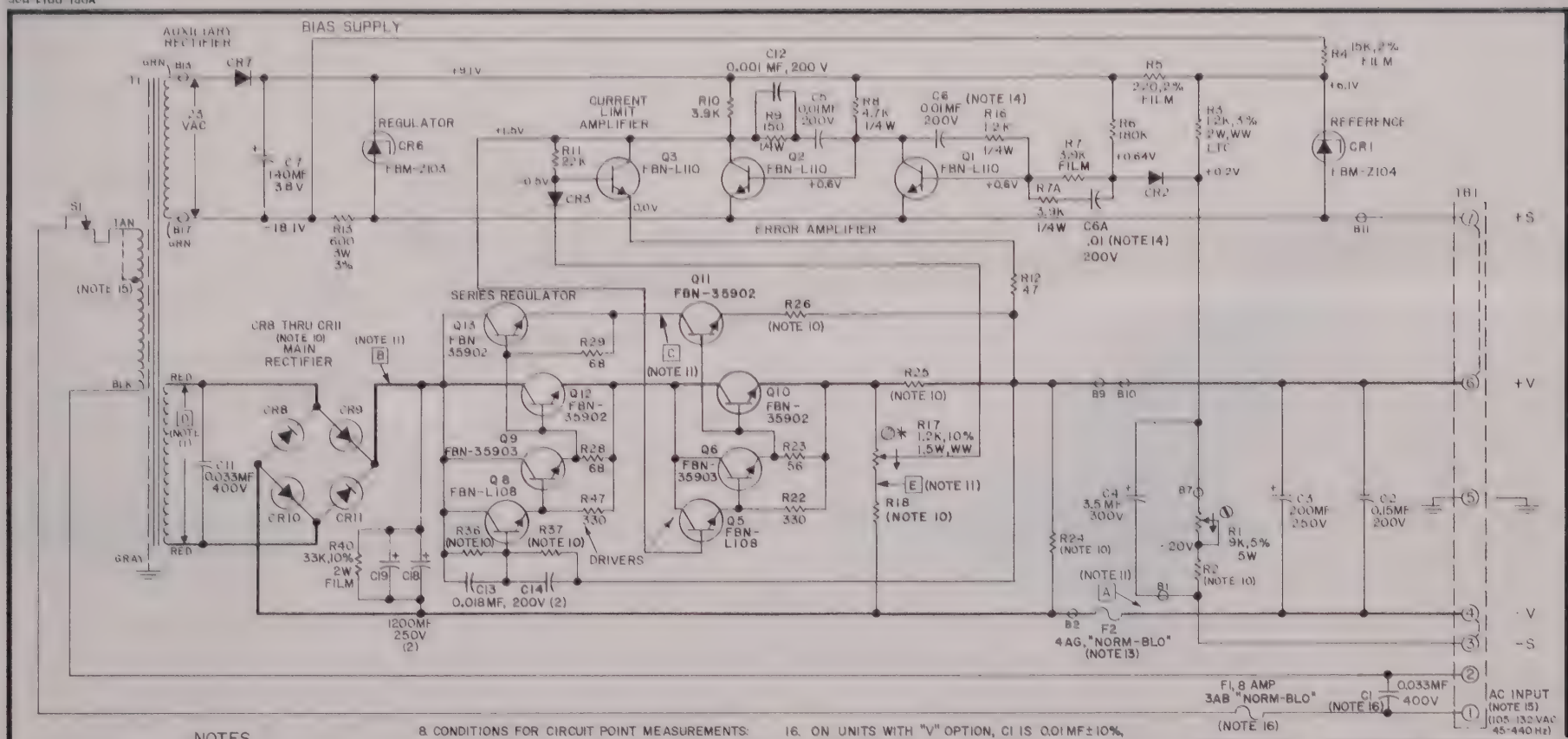
TABLE I

DATA REFERENCES FOR MODELS LM-E15 – LM-E60

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement					Schematic Components										
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	C3	C18, C19	Q6 (FBN-)	Q8-Q12 (FBN-)	R1 ±5% 5W	R2 ±3% 3W	R18 ±5% 1/2W	R24 ±10% 2W	R25A, R26A, R27A R26B, R27B	F1† (Amps)	F2 (Amps)
LM-E15	15±5%	14.0	12.7	11.5	8.6	-15.0	+12.0	-9.0	20.5	-5.0	2100MF, 35V 60V SURGE	14000MF, 35V 60V SURGE	36485	36485	2200	1800	2400	2200	0.47±5%, 8W	10 (5, SLO-BLO)	30
LM-E18	18±5%	13.0	11.8	10.6	8.6	-18.0	+13.4	-12.5	23.6	-2.7	2100MF, 35V 60V SURGE	14000MF, 35V 60V SURGE	36220	36220	2200	2500	6800	2200	0.47±5%, 8W	10 (6.25, SLO-BLO)	30
LM-E20	20±5%	12.0	10.9	9.8	8.5	-20.0	+14.2	-12.5	25.6	-3.0	1100MF, 60V 100V SURGE	7800MF, 60V 100V SURGE	36220	36220	2200	2500	6800	3300	0.75±5%, 8W	10 (6.25, SLO-BLO)	30
LM-E24	24±5%	11.0	10.0	9.0	7.6	-24.0	+16.1	-18.0	30.0	-3.6	1100MF, 60V 100V SURGE	7800MF, 60V 100V SURGE	36220	36220	2200	3600	6800	3300	0.75±5%, 8W	10 (6.25, SLO-BLO)	30
LM-E28	28±5%	10.0	9.0	8.0	7.1	-28.0	+16.4	-22.5	32.5	-4.2	1100MF, 60V 100V SURGE	7800MF, 60V 100V SURGE	36220	36220	2200	4500	6800	3300	0.75±5%, 8W	10 (6.25, SLO-BLO)	30
LM-E36	36±5%	8.0	7.3	6.5	5.7	-36.0	+20.0	-28.0	41.0	-3.9	1100MF, 60V 100V SURGE	7800MF, 60V 100V SURGE	36487	36487	3300	5600	10,000	3300	1.5±5%, 8W	10 (6.25, SLO-BLO)	30
LM-E48	48±5%	6.0	5.4	4.9	4.3	-48.0	+25.5	-40.0	53.4	-5.2	*1100MF, 60V 100V SURGE	3000MF, 100V 150V SURGE	35902 or 36487	35902 or 36487	3300	8000	10,000	4700	1.5±5%, 8W	10 (6.25, SLO-BLO)	30
LM-E60	60±5%	3.5	3.3	3.0	2.6	-60.0	+27.5	-50.0	63.0	-4.5	400MF, 100V 150V SURGE	3000MF, 100V 150V SURGE	35902	35902	4500	10000 5W	15,000 2%	5600	1.5±5%, 8W	8 (5, SLO-BLO)	30

*C3 WAS 400MF, 100V ON LM-E48

† Fuse ratings in parenthesis apply to units with "V" option.



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C CURRENT RATING FOR 45-55 Hz; FOR 360-440 Hz, SEE INSTRUCTION MANUAL.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING MICA WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES
12. IF Q5 OR Q8 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
13. SEE TABLE I FOR FUSE RATING.
14. R16 WAS 1/2W AND R7A, C6A NOT USED ON UNITS WITH SERIAL NO. PREFIX A.
15. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A & B, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
16. ON UNITS WITH "V" OPTION, C1 IS 0.01MF±10%, 1000V, PAPER, F1 IS 5A, 3AB

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
Q4	R15
CR4	R19-R21
CR5	R30-35
	R38-39
C8-C10	R41-46
C15-C17	R27

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-C

MODELS
LM-E100
LM-E120
LM-E150

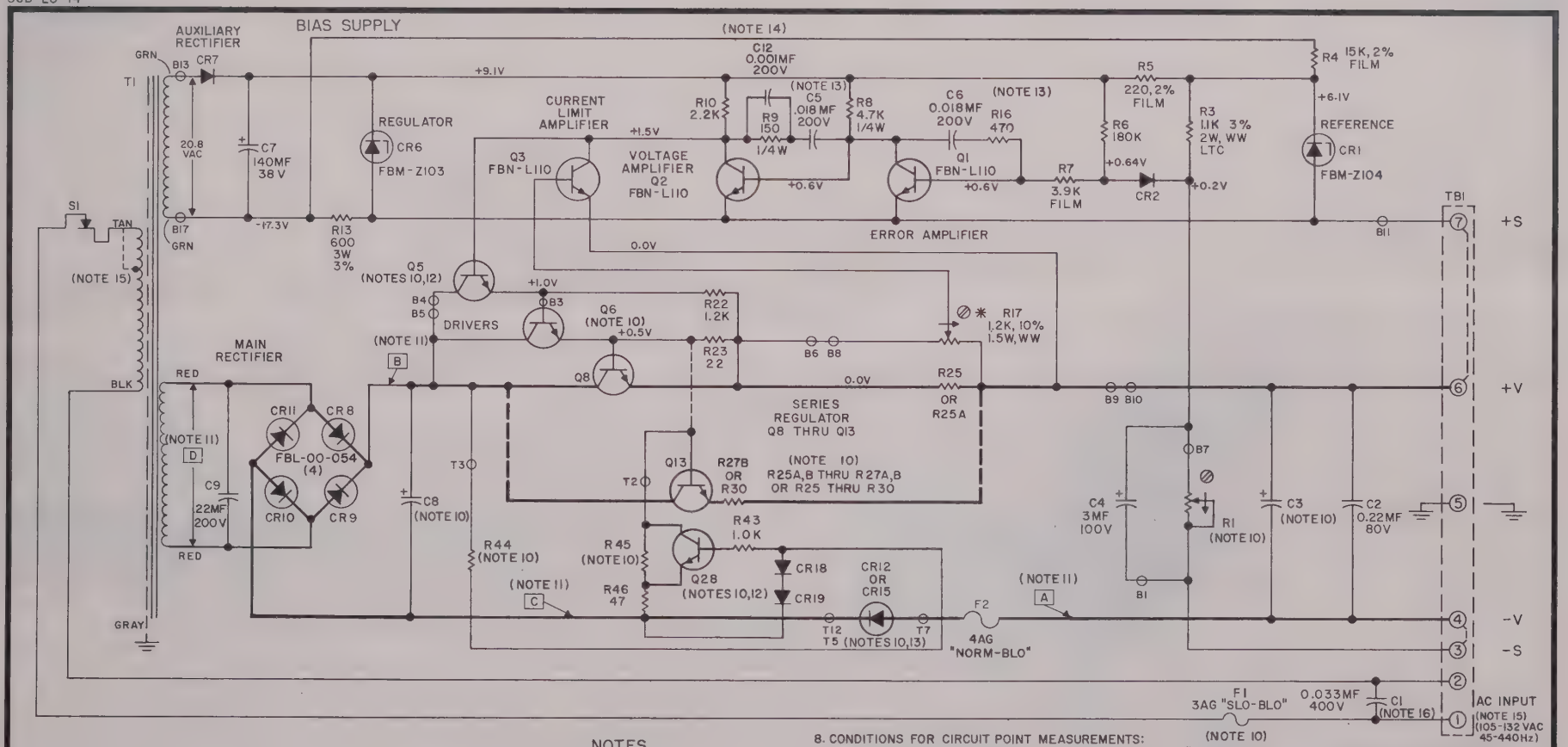
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA ELECTRONICS CORP. MELVILLE NEW YORK
A Veeco SUBSIDIARY

TABLE I

DATA REFERENCES FOR MODELS LM-E100, LM-E120 AND LM-E150

Model	Range (VDC)	Max. Current (Amperes)				Schematic Voltage Measurement					Schematic Components						
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	CR8-11 (FBL00-)	R2 ±3% 5W	R18 ±5%	R24 ±10% 2W	R25, R26 ±3%, 3W	R36, R37 ±3%	F2
LM-E100	100±5%	2.0	1.7	1.6	1.5	-100	+49.0	+23	107	-3.0	065	16K	39K 1/2W	22K	1.0.	8K 3W	5A
LM-E120	120±5%	1.7	1.5	1.4	1.2	-120	+56.5	+27	125	-3.1	065	20K	43K 1/2W	22K	1.5	8K 3W	5A
LM-E150	150±5%	1.4	1.3	1.2	1.0	-150	+69.5	+33	156	-3.2	066	26K	56K 1W	27K	1.5	10K 5W	3A



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - ↓ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▭ INDICATES ACTUAL UNIT MARKING
   - ✳ SEE INSTRUCTION MANUAL.
   - ⊣▶⊢ LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - ⊸ INDICATES TERMINAL ON PRINTED WIRING BOARD 'B', BOARD "T"
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C CURRENT RATING FOR 45-55 Hz, FOR 360-440 Hz, SEE INSTRUCTION MANUAL.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60Hz; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. IF Q5 AND/OR Q28 IS REPLACED RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
13. CR15 AND TERMINAL POINT ⊸ T7 ONLY USED ON MODEL LME-0-60; C5 IS .01MF; R16 IS 820 OHMS.
14. C12 ONLY USED ON MODEL LME-0-14.
15. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A & B, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
16. ON UNITS WITH "V" OPTION, C1 IS 0.01MF±10%, 1000V, PAPER.

REFERENCE DESIGNATIONS NOT USED	
Q4	R15,R18
Q7	R21,R24
CR3,4,5	R31-42
CR13,14	R19,20
Q14-27	CR16,17
R2,R11	C10,11
R12,R14	

MODELS
LME-0-14
LME-0-32
LME-0-60

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TBI INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-C

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA ELECTRONICS CORP. MELVILLE NEW YORK

A Veeco SUBSIDIARY

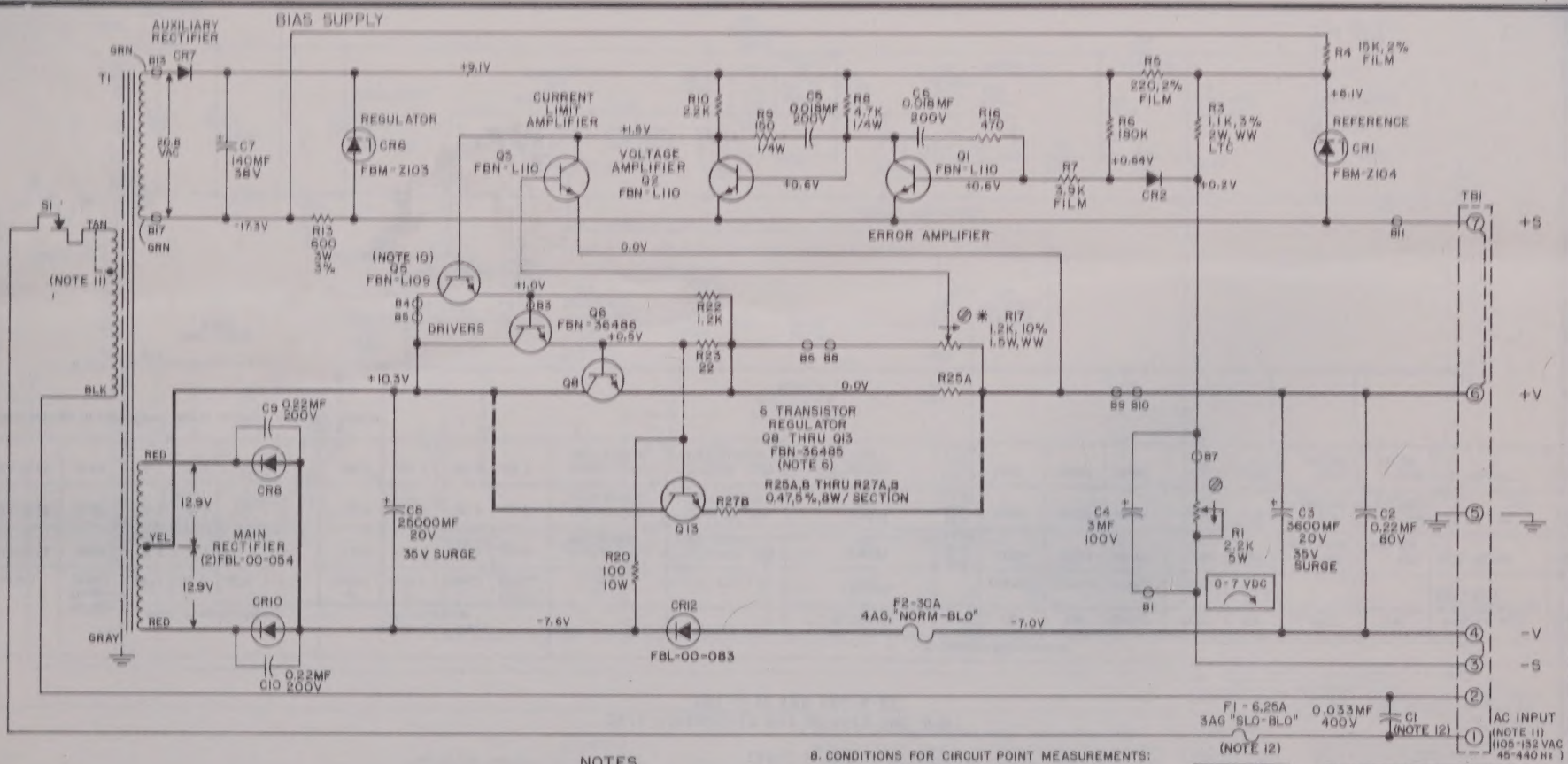
TABLE I

DATA REFERENCES FOR MODELS LME-0-14
LME-0-32 AND LME-0-60

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement				Schematic Components												
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	C3	C8	CR12(CR15) FBL-00-	F1*	Q5 (FBN-)	Q6 (FBN-)	Q8-13 (FBN-)	Q28 (FBN-)	R1 5% 5W	R44	R45	R25A,B,R26 A,B, R27A,B or R25 - R30	F2
LME-0-14	0-14	7.4	6.4	5.2	4.1	-14.0	+12.6	-14.5	19.9	2100MF, 35V 60V SURGE	14000MF, 35V 60V SURGE	(CR12) 083	10A (3A, 3AB)	L109	36486	36485	L148	3300	2200 10%,1/2W	820 10%,1W	0.75, 5% 5W	20A
LME-0-32	0-32	3.7	3.2	2.6	2.1	-32.0	+14.5	-32.5	34.0	1100MF, 60V 100V SURGE	7800MF, 60V 100V SURGE	(CR12) 083	10A (3A, 3AB)	L109	36488	36487	L148	9000	4700 10%,2W	2000 3%,3W	3.0, 3%, 3W	10A
LME-0-60	0-60	2.1	1.7	1.4	1.1	-60.0	+24.0	-60.5	60.5	400MF, 100V 150V SURGE	3000MF, 100V 150V SURGE	(CR15) 065	6.25A (3A, 3AB)	L108	35903	35902	L108	13000	4500 3%,3W	4500 3%,3W	3.0, 3%, 3W	5A

* Fuse ratings in parenthesis apply to units with "V" option.

SCB-E-07A



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD 'B'.
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C CURRENT RATING FOR 45-55 Hz; FOR 360-440 Hz, SEE INSTRUCTION MANUAL.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz, OUTPUT: 7 VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A & B, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
12. ON UNITS WITH "V" OPTION, C1 IS 0.01MF±10%, 1000V, PAPER, F1 IS 3A, 3AB.

REFERENCE DESIGNATIONS NOT USED	
Q4	R15,R16
Q7	R21,R24
CR3,4,5	R19
CR9	
CR11	
R2,R11	
R12,R14	

RATING TABLE	
AMB. TEMP	MAX. LOAD
40°C	12.0 A
50°C	10.5 A
60°C	8.5 A
71°C	6.8 A

(SEE NOTE 7)

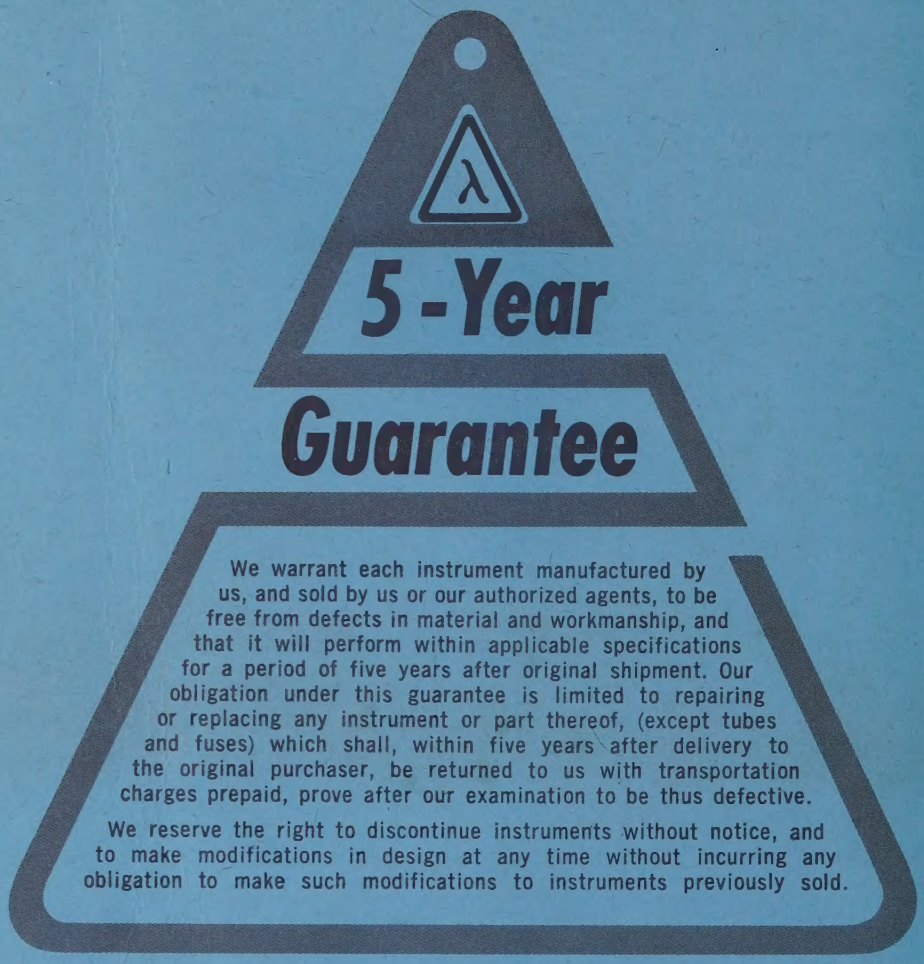
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-C

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
MODEL LME-0-7 0-7 VDC

LAMBDA ELECTRONICS CORP.
MELVILLE NEW YORK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Guarantee
We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.
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